The Plough, the Loom, and the Anvil.

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HEAR BOTH SIDES.

WE yesterday read an article in a morning paper, impliedly eulogistic of a high tariff and condemnatory of free trade, as the writer is pleased to style the present revenue policy of the government; a policy, by the way, which yields the government some fifty millions of dollars annually, and which steadily favors the increase of domestic produce, the exports of the last month being over $800,000 more than for the corresponding month of last year. Still, the high protectionists will insist that the country is laboring under all the evils of free trade, and that the evidences of wonderful prosperity that every where all over the country show themselves, are so many signs of bankruptcy and ruin, only deferred to the present by the intervention of the "Irish famine." Why all these misrepresentations? We have no free trade, nor is the country otherwise than prosperous. It is true there are some manufacturers who are making less than they desire, and they would have the law compel those engaged in other pursuits—the farmer, mechanic and laborer, at whatever occupation—pay to them such profits as would insure fortunes in a few years. There are some manufactories too, perhaps, worn out, or having in use machinery that cannot compete with others enjoying the most modern improvements, that may lose on their work. But that is no government affair, nor is it any proof that the same description of goods cannot be profitably produced in this country. Indeed, such goods are produced daily, and new preparations for their creation are daily making in almost every section of the Union. So much for the facts—now, a word for the sneer at free trade. I have corn and I want pork. My neighbor has pork and wants corn. We exchange; that is free trade. That is the thing which the protectionists sneer at and ridicule. They say to the farmer, Your free trade is a very bad thing for you; do you just pay the government a third of the price of the pork you get from your neighbor, and let him pay the third of the price of the corn he gets of you, and it will be much better for both of you. That is a tariff of protection. Which is best for farmers and all other laborers who have this description of tax to pay? The shoemaker makes shoes for his neighbors and takes their grain, meat and potatoes in payment. This is free trade. Would it be better for him and his customers to make him pay the government the value of one third of all he gets in exchange for his labor? That is the tariff policy. So it is with all other classes of society. Free trade permits every body to sell what they have for the best price they can get, and to buy what they want as cheap as they can. A farmer drives his wagon to market, gets the best price he can for his load, buys what he wants, and is on his return home. It is free trade thus far; but at the boundary of his county or his town, there is a little toll-house, the keeper of which makes him pay to the government a sum of money equal to one third of the value of all he has in his wagon. Is this better than free trade? Better than carrying home the money he has left? Would it be a good thing to have these toll-houses at the lines of all our towns, counties and cities, to take a third of all that comes in, or its value in money, from the farmers, mechanics and other laborers, who are always carrying the products of their industry to and fro for a market? Would it be better than free trade? Our Constitution establishes free trade between the States. Would it be better for our farmers and others if toll-houses or custom-houses were erected on every road, river and canal, where it crossed a State line, to take from every passing cart, wagon or boat, for the use of the government, one third of all the produce and goods transported in them or their value in money? Would it have been wiser in the framers of the Constitution to have given us such a system, instead of the free trade that they established? Few there are who will maintain that it would be a good thing for farmers to be taxed on the road to their neighbors, or at the town, with the products of their farms or the goods or other produce they have purchased by their sale. What difference does it make whether the farmers and mechanics who exchange products live

on opposite sides of a stone fence or of the Atlantic ocean? What difference does it make whether the articles coming in exchange for the farmers' products are taxed at the gate as they enter his yard, or at the Philadelphia custom-house, where they enter his country? Is it not the same to him? Is it better for him that they should be taxed at either than that they should not be taxed at all? Is it better that the tariff should deliver them, taking from the farmer one third of their value at the same time, or that free trade should deliver them without taking from him any thing? So much for our neighbor's sneer at free trade.—*Public Ledger.*

From the day on which we commenced the publication of this journal, we have made it an invariable rule to practise perfect free trade in reference to ideas, permitting our opponents to lay their views before our readers, and we have never in a single case replied to any of the many attacks that have been made upon us without also giving the attack itself. We have desired that our readers should form an intelligent judgment in reference to that greatest of all questions for the Union, THE IMPORTANCE OF MAKING A MARKET ON THE LAND FOR ALL THE PRODUCTS OF THE LAND, thereby enabling the farmer to return to it the manure yielded by its crops, maintaining, and even increasing its power of production, *thus increasing the value of the land*—and at the same time enabling him to find employment for the spare labor of himself, his sons, his wagon and his horses, when not required upon the farm, and for that of his daughters, unfit for out-door employment, *thus increasing the value of labor.* In accordance with this our usual mode of proceeding, we now lay before them the above argument from the Philadelphia *Public Ledger*, in favor of the system known in the British books by the name of free trade, the object of which is the perpetuation of the British monopoly of machinery for the production of cloth and of iron, and the maintenance of the power of Britain to compel all the farmers and planters of the world to make their exchanges in her single market, that she may there fix the prices of all she requires to buy, and of all she desires to sell. It is the argument, too, of that portion of the community which sees advantage to the farmer from the exhaustion of his soil in raising commodities for foreign markets, and injury to him from every effort tending to bring the market to his door, and place the consumer by the side of the producer; and will, therefore, as we trust, be studied by all our readers, to whose careful perusal we strongly recommend it.

In thus circulating the arguments of our opponents, our object is, and has been, that of finding among them some one possessing either the courage to defend his doctrines, or the honesty to admit that they were indefensible, but thus far we have failed to find even a single one possessed of either of these qualities. We have invited them to publish our views, weak and fallacious as they hold them to be—and have offered in return to lay their powerful arguments before our readers; yet advantageous as would appear to be such an arrangement, not one as yet has ventured to accept it. They stigmatize the arguments of their opponents as "fallacious," yet fear to circulate them! They profess to regard their own arguments as being unanswerably true, yet will they not accept our offer to circulate them among the advocates of protection! They shout "Free trade! Free trade!" and would have the world believe that they alone are the opponents of restrictions upon the freedom of exchange, well knowing at the moment that we advocate protection as *the true and only possible mode by which freedom of trade can be reached.* In all this there is, as it appears to us, strong evidence that the opponents of protection doubt the truth of their own doctrines. Were it otherwise, would they not gladly re-publish our arguments with a view to show their weakness, and would they not as gladly avail themselves of our offer to exhibit to our readers the

strength of their own? We reprint theirs, and will reprint those of any journal of equal standing with our own that will do as much by ours, and thus do we prove our perfect conviction of the truth of what we have to say; but of all the journals professing "free trade," not one, we fear, will be found to follow our example in permitting their readers to see both sides of this great question, and thus enabling them to form a judgment for themselves.

Of all the journals that meet our eyes, we know of no one more persevering than is that from which we take this extract, in its efforts to prevent the adoption of measures tending to enable the farmer to bring the market to his door, and thus to enable him to find employment for himself, his sons and his daughters, while enriching his land with the refuse of its crops—none more pertinacious in its efforts to prevent the adoption of any measures tending to protect the American laborer in his competition with the half-starved, ill-clothed, and down-trodden laborers of Europe—none more ready to seize upon any stray fact to be used as a set-off against the thousands of facts that are brought forward in support of the doctrine, that if the farmer and planter would prosper, they can do so only by acting in accordance with the doctrine of Adam Smith, who taught that the true place for the artisan was to be found in the midst of the producers of the raw materials that were to be converted, and of the food that he was to eat while converting these raw materials into the forms fitting them for transportation to distant markets. It is for that reason that we now re-publish its views, and we do so in the hope that it will, *for once*, enable its readers to see both sides of the question, as we certainly shall do in relation to any rejoinder it may see fit to make to what we have now to say. *We* scorn to deceive our readers. They, at least, shall have laid before them the arguments of the opponents as well as of the friends of the protective policy, and if they act with us, it shall be upon full conviction.

As usual, this free-trader begins with the public revenue. The tariff of 1846 yields much revenue, and therefore it must be retained. In 1832, protection was found to yield too much revenue, and therefore it was to be annihilated. Such is the consistency of free-traders! The argument of to-day differs always from that of yesterday, yet do they reproach their opponents with teaching "fallacies!" The free-trader of '46 contended that the power of *the people* to consume was diminished by protection. The free-trader of to-day is content that *Government* has much to waste, and it is indifferent to him whether the means of the people increase or decrease under the present system. To prove to him now that the people consume less cloth and far less iron than they did four years since, notwithstanding the vast growth of population, is a waste of words. He points triumphantly to the revenue, and so did he do in 1836, when the nation had just arrived at the brink of the precipice, as soon was proved. He is opposed to any interference of Government for the protection of the farmer in his efforts to draw to his side the spindle and the loom, the hammer and the anvil; yet does he rejoice that the Government can collect a large amount of taxes to be employed in supporting steamships in *their* competition with the cheap labor and cheap capital of Europe, and fleets of Government vessels in looking after the ships and ministers resident and ministers plenipotentiary, in scrutinizing the operations of other countries in the hope to find more employment for ships—and thus is he ever the advocate of governmental interference in one direction while denouncing it in another, compounding

——— "for sins he has no mind to,
By damning those he's not inclined to."

The piston that drives the steamship must be protected, but it is held to be contrary to sound policy to protect the one which drives the cotton mill.

What, however, are the facts in regard to this revenue? Does not this writer know well that since the passage of the bill of '46 we have contracted a foreign debt of at least a hundred millions, making, with that contracted under the compromise, not less than three hundred millions? Does he not know that the amount of interest now payable abroad requires almost eighteen millions of dollars per annum? Does he not know that each and every day increases the amount of bonds and stocks held in Europe, and in a corresponding degree the sum required to discharge the interest? Does he not know that we had in 1836 an equal amount of revenue, and that the laudation of free trade was then the same as now? It gave us surplus revenue, and doing so, it was then, as now, held to be perfectly clear that protection was "a fallacy," and yet does he not know that in a few short years the Government was on its knees to the brokers and shavers of Europe, soliciting a loan, and meeting every where with repulse? Does he not know that such is the inevitable tendency of things at the present moment? Does he not see that enormous importations and large revenues must inevitably be followed, as were those of 1836, by small importations and small revenues, when the Government will again be in the market as a borrower? Does he not know that it was the protective tariff of 1828, and the large and *constantly growing* revenue which it gave, that *annihilated the public debt in* 1834? Does he not know that it was the *constantly diminishing* revenue under the compromise that built up the debt which existed in 1842? Does he not know that the rapid growth of revenue under the tariff of 1842 enabled us at once to cease borrowing and commence the payment of the debt? Does he not know, and see, and feel, that the present revenue is due to a credit that, *destroyed by the compromise*, was reconstructed under the tariff of '42, and that tends now to disappear with every increase of debt, precisely as would be the case with an individual? If he does not know these things, we would recommend him to study anew the facts in relation to the public revenue and the public debt, before he shall again undertake to write of either.

The tendency of REVENUE under protection has invariably been upwards and permanently so, whereas under the system commonly called free trade—*lucus a non lucendo*—it has invariably been downward, except so long as credit has enabled us to contract loans—or rather to buy goods without paying for them.

The tendency of CREDIT has invariably been upward under protection, and as invariably has it disappeared after the withdrawal of protection, because with its withdrawal there has been invariably *a diminished power to pay* for foreign merchandise, and *an increased necessity for running in debt*, the consequence of which to a nation is precisely the same as to an individual.

The tendency of PUBLIC EXPENDITURE has invariably been upward under the system called free trade, and as invariably downward under protection. The one system looks to increasing the power of Government, while the other looks to its diminution.

The tendency of THE PUBLIC DEBT has invariably been downward under protection, because large home production gave great power to purchase foreign commodities, and to contribute to the support of Government. We had much to sell and could *pay for* much produced elsewhere. It has as ivariably been upward under the withdrawal of protection, because small home production was accompanied by diminished power to pay for foreign commodities, and the revenue fell off as soon as we had exhausted our credit.

We are here told of the increase of domestic produce exported, but our political economist carefully avoids to inform us whether this increase is of a character to be profitable to the farmer who produces the commodities exported. The *value* of exports has in some cases increased, because of short crops—*producing* temporarily *the same effect on foreign prices that would have been produced* permanently *by increased home consumption*, had our free-traders permitted it to increase. We have raised little cotton, and therefore the price has been high; but so soon as it came to be ascertained that the crop of the present season would reach 2,300,000 bales, it fell to little more than the price of 1846, *the last of four large crops*, by which the markets of Europe had been glutted. The average crop of the years 1843 to 1846 was about 2,200,000 bales, and the average price of the last of those years was 7·3 cents per pound, while the price of middling—which is the average of the crop—is now in Mobile and New-Orleans but 7½ to 8 cents, although this is *the last of three small crops*. Should present prospects be realized, the next crop will reach, if not exceed, three millions of bales; and what then will be the price? Our free-trader will then boast of the *quantity* exported, and not of the *value*. The tariff of 1846 has effectually prevented the building of mills throughout the northern portion of the Union, and the addition at the South is too small to have any effect upon such a crop; whereas had the tariff of 1842 been permitted to remain, we should now have machinery for the conversion of more than a million of bales into cloth, and the quantity to go to Europe would be much less out of a three million crop than it was in 1845 out of one of 2,400,000 bales. Our sagacious political economist would inquire what we should do with all this cloth? In answer, we tell him that we should be now mining six millions of coal for the supply of furnaces, factories, and steamships, and the prosperous workers in those mines, furnaces and factories. Prosperous miners would need food, and coal, and iron, and cloth; and prosperous farmers would need cloth, and iron, and fuel; and prosperous furnace-men would need fuel, and cloth, and food; and prosperous operatives would have abundant cloth to give in exchange for food and fuel and iron; and thus would all be benefited, while the planter would be receiving higher prices for a large crop than he has been accustomed to receive for a small one, and consuming thrice as much of the products of the North as he will now do when next his crop is large.

The columns of the *Ledger* abound with suggestions of over-production of various commodities, but it is time that gentlemen who undertake to teach political economy should understand that *every man is a consumer to the whole extent of his production*, and that what he calls "over-production" is but a consequence of under-production of other articles to be offered in exchange for them. If he doubt this, we would recommend him to study the work of Mons. J. B. Say,* who is, we doubt not, high authority with him, and there he will find that "*a product is no sooner created than it, from that instant, affords a market for other products to the full extent of its value.*" Looking further in the same work, he will find that "it is because the production of some commodities has declined, that others have become superabundant." Again, he will be told,

> That in every community, the more numerous are the producers, and the more various their productions, *the more prompt, numerous and extensive are the markets for those productions;* and by a natural consequence, *the more profitable are they to the producers, for price rises with the demand.*

* Book I., chap. XIV.

What, now, is the policy advocated by our contemporary? Is it not that which tends to convert the miners and furnace-men and the mill operatives into farmers, and thus to diminish the variety of their productions, and to render less prompt, less numerous, and less extensive the market for their products? Does he not know that the man who eats the food while mining the coal or ore, and he who converts the food and fuel and ore into iron, are compressing into a small space a vast bulk of food and other raw produce of the earth, so as to fit it for transportation to distant markets? Does he not know that England is the largest exporter of food in the world? If he does not, we would recommend him to read a letter on that subject by the *free-trade* member of Parliament, Mr. Brown, and afterwards to study carefully the following extract from a high free-trade authority, Adam Smith, who perfectly appreciated the importance of making a market on the land for all the products of the land:—

An inland country, naturally fertile and easily cultivated, produces a great surplus of provisions beyond what is necessary for maintaining the cultivators; and on account of the expense of land carriage, and inconveniency of river navigation, it may frequently be difficult to send this surplus abroad. Abundance, therefore, renders provisions cheap, and encourages a great number of workmen to settle in the neighborhood, who find that *their industry can there procure them more of the necessaries and conveniences of life than in other places. They work up the materials of manufacture which the land produces, and exchange their finished work, or, what is the same thing, the price of it, for more materials and provisions.* They give a new value to the surplus part of the rude produce, by saving the expense of carrying it to the water-side, or to some distant market; and they furnish the cultivators with something in exchange for it, that is either useful or agreeable to them, upon easier terms than they could have obtained it before. The cultivators get a better price for their surplus produce, and can purchase cheaper other conveniences which they have occasion for. *They are thus both encouraged and enabled to increase their surplus produce by a further improvement and better cultivation of the land; and as the fertility of the land has given birth to the manufacture, so the progress of the manufacture re-acts upon the land, and increases still further its fertility.* The manufacturers first supply the neighborhood, and afterwards, as their work improves and refines, more distant markets. For though neither the rude produce, nor even the coarse manufacture, could, without the greatest difficulty, support the expense of a considerable land carriage, the refined and improved manufacture easily may. *In a small bulk it frequently contains the price of a great quantity of the raw produce. A piece of fine cloth, for example, which weighs only eighty pounds, contains in it the price, not only of eighty pounds of wool, but sometimes of several thousand weight of corn, the maintenance of the different working people, and of their immediate employers.* The corn which could with difficulty have been carried abroad in its own shape, is in this manner virtually exported in that of the complete manufacture, and may easily be sent to the remotest corners of the world. In this manner have grown up naturally, and as it were of their own accord, the manufactures of Leeds, Halifax, Sheffield, Birmingham and Wolverhampton. Such manufactures are the offspring of agriculture.

These views are in perfect accordance with the facts. The laborer rejoices when the market for his labor is brought to his door by the erection of a mill or a furnace, or the construction of a road. The farmer rejoices in the opening of a market for labor at his door, giving him a market for his food. His land rejoices in the home consumption of the products it has yielded, for its owner is thereby enabled to return to it the refuse of its product in the form of manure. The planter rejoices in the erection of a mill in his neighborhood, giving him a market for his cotton and his food. The parent rejoices when a market for their labor enables his sons and his daughters to supply themselves with food and clothing. Every one rejoices in the growth of a home market for labor and its products, for trade is then increasing daily and rapidly; and every one mourns the diminution of the home market, for it is one the deficiency in which cannot be supplied. Labor and commodities are wasted, and

the power of consumption diminishes with the diminution of the power of production, trade becomes languid, labor and land diminish in value, and laborer and capitalist become daily poorer.

The opponents of protection deny the truth of this. They say that we are an agricultural nation, and must so continue, and that we must have a surplus of food and cotton, and that it is quite idle to suppose that a market could be made at home for the hundreds of millions of bushels of food for which, as is alleged, we need a market. Our exportation of food is, however, a mere trifle, while that of England is immense, because England adopts the idea of Adam Smith in combining the food and the wool, and sending to distant markets *thousands* of pounds weight of corn combined with *tens* or *hundreds* of pounds of cotton, in the form of a piece of cloth. The object of the advocates of protection is that of the extension of the power to maintain trade with distant nations, by bringing about the establishment of machinery at which the wool and the food may be combined with each other, and so reduced in bulk as to fit them for transportation; and that protection does produce that result is obvious from the fact that we now export largely of manufactures of which but recently we were large importers—that the German Customs Union, or *Zoll Verein*, now exports largely of various commodities for which, until protection was established, Germany was wholly dependent upon foreigners—and that the whole competition with England for the trade of the world is with those countries that have established protection—to wit: France, Belgium, Germany, and the United States. The object of the system called in Britain free trade, and advocated by the *Ledger*, is that of *compelling* our farmers and planters to continue to export their products in the most bulky form, thereby exhausting both the land and themselves—for the farmer who sells off the produce of his land to be consumed at a distance, is selling the soil which constitutes his capital. The nation that exports raw produce has a limited market and pays heavy transportation, and remains poor; whereas the nation that finishes the work of production by converting its wool and its cotton into cloth, and its food into iron, and thence into machinery of iron, has before it the trade of the world, and the cost of transportation is trivial—and as the cost of going to market falls always on the producer, it is obvious that as that cost is diminished the farmer and planter must grow rich.

Why is it that the people of this country export raw produce? Why should they be guilty of the folly described in the following passage, which we copy from an article by the *free-trade* editor of the Democratic Review?—

> What a strange absurdity it is to see silk going from China and France, cotton from the Southern United States, wool from Australia, coffee and sugar from Brazil, wheat from New-York, Michigan, Odessa, and Poland, hemp and flax from St. Petersburg, pork and lard from Ohio and Illinois, concentrating in Lancashire, to be returned in goods to the localities from whence they came!

It *is* a strange absurdity. The Tennessee planter sends his corn and his cotton to New-Orleans, that both may cross the ocean together, the corn to be eaten by the child that spins the wool and the woman who weaves it, and he pays for transporting and exchanging the food and the wool *five times as much as it would have cost him to have the wool spun and woven at home*—the consequence of which is, that instead of obtaining one bale of cloth for two bales of cotton, he has but one bale for five—and instead of obtaining two pounds of cloth for a bushel of grain, he has less than half a one—and this is the mode, according to our *free-traders*, in which he is to grow rich.

Were this all, it might be borne; but it is very far from all. Throughout

the country, the land, constantly cropped for the supply of distant markets, is impoverished, *and thus is the farmer constantly wasting his capital.* The effect of this is so well described by Professor Johnston, an eminent agriculturist who recently travelled through this country, that we are induced to lay his views before our readers:—

I will briefly refer to some points which came under my observation in that part of the country which I visited. First of all, as to the state of agriculture in the northern parts of America, in our own provinces and in New-England, with which we are ourselves more familiar, when I tell you generally that the state of agriculture in those parts of America is what the state of agriculture in Scotland probably was eighty or ninety years ago; and when I tell you that in some parts of New-Brunswick they are very nearly in the precise condition in which Scotland was one hundred and twenty years ago, you will have an idea of the state of agriculture in North America. The system of agriculture is no farther forward—it is exceedingly far behind.

Now what has been their procedure—by what kind of procedure have they brought about *the state of exhaustion to which the soil has been reduced?* Of course, in speaking of the exhausted soil, I do not refer to the virgin soil which has never received the plough or the spade, but to the soil under their cultivation, and *which they are now exhausting.* When I tell you how the land is cultivated, you will understand how this exhaustion has been produced. The forest is in the first place cut down and burnt, after which the ashes are scattered, and a crop of wheat and oats is sown. When this crop is cut down another is sown; but they do not always remove the straw—they do not trouble themselves with any manure. The second year they sow it again and harrow it, and generally take three crops in succession. When they can take no more out of it, they either sow grass seeds, or as frequently let it seed itself. They will then sometimes cut hay for 12, 14, 16, 18, or 20 years in succession; in fact, as long as they can even get half a ton an acre from it. And you may suppose what is the natural fertility of the land, when they are able to obtain as much as three or four tons per acre at first, and go on cutting it for twelve years. They will probably have two tons an acre during all that length of time. The land is then broken up, and the crop of oats taken, then potatoes, then a crop of wheat, and then hay for twelve years again, and so the same course is repeated. Now this is the way in which the land is treated—*this is the way in which the exhaustion is brought about.* This exhaustion exists in Nova Scotia, New-Brunswick, Lower Canada, in Upper Canada to a considerable extent, over the whole of New-England, and extends even into the State of New-York.

Now, the condition of things in the Western States, in reference to England, is precisely the same as the condition of England in reference to the wheat-producing countries of the Baltic. The condition of the farmers is exceedingly bad, and in Maine I was informed that they were all in a state of bankruptcy. The land is all mortgaged, which hangs like a mill-stone round their necks, and is worse even than the state of farmers in this country. They are thus unable to compete with the western parts of New-York or Lake Ontario. You have all heard of the famous wheat of Genesee, where the land is more fertile than in any part of Great Britain; and I learned there that they are laying the land down to grass, *because they cannot afford to grow wheat.*

In New-Brunswick, New-England, Vermont, New-Hampshire, Connecticut and New-York, the growth of wheat has almost ceased, and it is now *gradually receding farther and farther westward.* Now, when I tell you this, you will see what I believe to be the case is really the case—that it will not be very long before America will be unable—in *fact the United States are unable now—to supply us with wheat in any large quantity.* If we could bring Indian corn into general use, we might get plenty of it; but I do not think that the United States need be any bugbear to you. I believe the great source of competition you will have to contend with is the Baltic, and the countries on the borders of the Black Sea.

Why is it that the farmers and planters of the country pursue a policy so adverse to their interests? Why should they desire to exhaust the land and thus diminish its power of production, while increasing the cost of transporting to market the small quantity they do produce, and thus destroying the value of both land and labor? The answer is that they do not desire it, but that they are subjected to a policy having for its object that of compelling them to make all their exchanges in distant markets, and to pay hosts of mid-

dlemen for doing that which they could better do themselves, while wasting on the road and in those distant markets the manure that should be returned on the land; the consequence of which is, that they are always increasing their distance from market, because of the necessity for abandoning worn-out lands, the owner of which has wasted his capital in obedience to the laws of what is called free trade. What man of all these but is fully aware of the advantage that would result from bringing consumers of food to take their place by the side of producers of food? Not one of them hesitates even for a moment to believe in the views taught by Adam Smith, *when laboring for the abolition of the British monopoly system*, having for its object to make of Great Britain "the workshop of the world" as here given:

"Without the assistance of some artificers, indeed," says Dr. Smith, "the cultivation of land cannot be carried on, but with great inconveniency and continual interruption. Smiths, carpenters, wheelwrights and ploughwrights, masons and bricklayers, tanners, shoemakers, and tailors, are people whose service the farmer has frequent occasion for. Such artificers, too, stand occasionally in need of the assistance of one another; and as their residence is not, like that of the farmer, necessarily tied down to a precise spot, they naturally settle in the neighborhood of one another, and thus form a small town or village. The butcher, the brewer, and the baker soon join them, together with many other artificers and retailers, necessary or useful for supplying their occasional wants, and who contribute still farther to augment the town. The inhabitants of the town, and those of the country, are mutually the servants of one another. The town is a continual fair or market, to which the inhabitants of the country resort, in order to exchange their rude for manufactured produce. It is the commerce which supplies the inhabitants of the town, both with the materials of their work, and the means of their subsistence. The quantity of the finished work which they sell to the inhabitants of the country, necessarily regulates the quantity of the materials and provisions which they buy. Neither their employment nor subsistence, therefore, can augment, but in proportion to the augmentation of the demand from the country for finished work; and this demand can augment only in proportion to the extension of improvement and cultivation. *Had human institutions, therefore, never disturbed the natural course of things, the progressive wealth and increase of the towns would, in every political society, be consequential, and in proportion to, the improvement and cultivation of the territory or country.*"

The whole object of the British system is, and has at all times been, to produce directly the reverse effect. Every species of manufacture was forbidden in America, and as far as possible "discountenanced" in Ireland, that both might be *compelled* to employ English ships, English merchants, English looms, and English workmen, and thus contribute largely to the system of ships, colonies, and commerce, by aid of which Britain aimed to rule the world. The extreme injustice of this system was obvious to Dr. Smith, who said of it that

To prohibit a great people, however, from making all they can of every part of their own produce, or from employing their stock and industry in a way that they judge most advantageous to themselves, *is a manifest violation of the most sacred rights of mankind.*

The impolicy of the system, as regarded the interests of Britain herself, was shown to be as great as the injustice to her colonists, because tending to drive British capital from the profitable home trade to the comparatively unprofitable foreign one.

"The most advantageous employment of any capital to the country to which it belongs," says Dr. Smith, "is that which maintains there the greatest quantity of productive labor, and increases the most the annual produce of the land and labor of that country. But the quantity of productive labor which any capital employed in the foreign trade of consumption can maintain, *is exactly in proportion to the frequency of its returns.* A capital of a thousand pounds for example, employed in a foreign trade of consumption, of which the returns are made regularly once in the year, can keep in constant employment, in the country to which it belongs, a quantity of productive labor, equal to what a thousand

pounds can maintain there for a year. If the returns are made twice or thrice in the year, it can keep in constant employment a quantity of productive labor, equal to what two or three thousand pounds can maintain there for a year. A foreign trade of consumption carried on with a neighboring, is, upon that account, in general, more advantageous than one carried on with a distant country; and, for the same reason, a direct foreign trade of consumption is in general more advantageous than a round-about one."

The nearer the place of exchange, the greater is the advantage of the parties by whom the exchanges are made. The farmer and the miller who exchange directly with each other, divide between themselves the whole product of the wheat, but if they employ a middleman they must give him a portion of the product for doing that which they might better have done themselves. Adam Smith saw that as the market was made on the land for its products, the farmer was enriched, and his power of purchasing the produce of distant lands was increased, and he saw clearly that his countrymen were injuring themselves as well as "violating the most sacred rights of mankind," in pursuing the system which looked to converting Great Britain into that which it has since become, one vast workshop.

Instead of following his advice and establishing free trade *in the sense in which he desired it*, that is, with a view to permit the artisan every where to take his place by the side of the food and the raw materials of manufacture, she sought free trade *with directly opposite views*—those of preventing the consumer from any where taking his place by the side of the producer, and *compelling all nations, in the name of free trade, to make all their exchanges in England.* With that view, she passed repeated laws prohibiting the export of artisans, colliers, and machinery of all kinds, and when at length machinery and artisans were smuggled out of the kingdom to such an extent as to enable foreign nations to compete with her, and the maintenance of those prohibitions became useless, she deliberately resolved to sacrifice her agriculturists to her manufacturers, in the vain hope of thereby inducing foreign nations to abandon the policy of Adam Smith, which taught the advantage of bringing the consumer and the producer into close connection with each other, and to adopt that of Mr. McCulloch, which teaches the advantage to be derived from an increase in the number of middlemen, to be maintained at the cost of the man who produces the food and that other who requires to consume it.

Her whole effort is to secure to herself a monopoly of the machinery for converting cotton and wool into cloth, and food and clothing and fuel and ore into iron; and the result of that effort is and long has been a steady deterioration of the condition of her own people, and the ruin of the people of her colonies. Ireland and India, the West Indies and Portugal—the latter long a mere colony—have all in succession been ruined, as this country would have been but for protection against the system so strongly denounced by Adam Smith. Canada is unprotected, and land may be bought on one side of the line for one fifth of what it will readily command on the other. Why is this? The man on the south of the line has a market for his products which the other has not. Canada has free trade, yet she desires annexation. Why? *Because it will increase the value of both labor and land to be brought under a protective tariff.* It is really time that gentlemen who are accustomed to the publication of such platitudes as that we now copy from the *Ledger* should undertake to explain a few of the facts presented to them for consideration by the advocates of protection. Let them, if they can, explain the cause of the ruin of Ireland by any other process than that of the waste of labor and manure, consequent upon the separation of the producer and the consumer. Let them explain the cause of the present condition of Portugal, the West Indies and India. All these countries have had the *advantage* of free-trade with England,

yet all are in a state of ruin; and such is the condition of India, with her ruined cotton manufactures, that the Government is now enabled to exist only by aid of the power which it possesses *to enforce the smuggling trade in opium*—the most infamous trade—the slave-trade not excepted—in which a nation was ever concerned. Let them explain to us why it is that *free-trade* India should be so reduced as to be compelled to depend for its revenue upon the power to produce demoralization among its neighbors. Let them explain why it is that land in the States immediately adjoining the boundary line is worth five times as much as it is in Canada. Let them explain why nearly the whole emigration from Europe is directed to the United States, when free-trade Canada is open to it, with land at one fifth of the price. Let them explain why it is that Canada, with the *advantage* of free trade with "the great grain market of the world," seeks absorption into the Union. Let them explain the universal poverty of this country in the years prior to the passage of the tariff of 1828. Let them explain, if they can, the wonderful growth of trade and of revenue under the highly protective tariff of 1828. Let them explain the almost annihilation of trade and of public revenue under the free-trade clauses of the compromise. Let them explain the wonderful resuscitation of trade, of credit, and of public and private revenue under the tariff of 1842. Let them explain why it was that the consumption of iron doubled under the tariff of 1842, and why it has since gone back in absolute quantity, notwithstanding the vast growth of population in the period that has elapsed since the passage of the tariff of 1846. Let them also explain why the consumption of cotton, which doubled in the five years following the passage of the tariff of 1842, is now less by one hundred and fifty thousand bales than it was four years since.

The writer of this article describes free trade, and then informs his readers that this is what "protectionists sneer at and ridicule." We are bound of course to believe that he supposes that to be the case, as we cannot suppose that he would thus deliberately state what he knew to be untrue, and therefore it is that we ascribe this statement, and indeed the whole paper, to the want of knowledge so universal among the advocates of the maintenance of the British monopoly system. Few things are more remarkable than the almost universal deficiency of knowledge of the disciples of the Ricardo-Malthusian system of political economy—that system which teaches that one nation should raise cotton and another should convert it into clothing—and that deficiency extends not only to the facts of the case, but to the views of their opponents. The protectionists of this country do nothing of the kind that is here attributed to them. They are more thorough free-traders than is the writer of this article. They do not believe in incidental protection and revenue duties of 30 per cent. called free trade. They believe in the abolition of custom-houses and the establishment of *perfect freedom of trade*, and it is because they *know* that protection is the *true and only road to perfect freedom of trade*, that they advocate the establishment of such a system of protection as shall at the earliest possible moment enable us to establish freedom of exchange with all the world. The views of the advocates of the system which looks to freeing ourselves and the world at large from the tyranny of the British monopoly system are so well explained in the closing portion of an article given in the last number of the *Merchants' Magazine*, that we are tempted to lay it before our readers, in the hope that the offer therein made may be accepted by our contemporary of the *Ledger*:—

> With every association leading me to favor it, and after serious endeavors, and no little study, for years, I could not convince myself of the soundness of the protective policy, and did not, till the "Past, Present, and Future" reconciled that policy to the logic

of free trade. In common with Mr. Carey, I hold to that logic still. We are opposed to indirect taxation,—we think that duties on imports are indefensible as a mode of raising revenue from our own citizens, and that unless they can be justified on the ground of protection, not as the incidental result, but as the primary object, they cannot be justified at all. We do not ask that domestic labor in one or more departments of industry should be fostered by the Government at the expense of others. We concede that all men should be permitted to buy in the cheapest market, and sell in the dearest. We put no stress on the common notion of the balance of trade, that the country may be impoverished by the draw of its specie in payment for imports. In short, we have the same ends in view as the friends of free trade—and adopt no line of argument which is not warranted by its most distinguished advocates. We are ready to admit ourselves beaten unless we can show that *perfect protection is the shortest road to perfect freedom of trade;* and that the interest, not of producers, but of the *consumers* of protected fabrics, is subserved by following it. Upon these terms we are ready to discuss the question whenever the opportunity may be presented, asking only that both sides may be freely heard through the same medium. To many of the friends of protective policy, I am aware, it will seem that we are abandoning tenable ground, while to its opponents the challenge will appear mere bravado. To both of these classes, I only can say that if they will study Carey for themselves, they will be convinced that the offer is made in good faith, and that it is too late for any man to venture upon the discussion, on either side, who is not acquainted with Mr. Carey's "Past, Present, and Future." Meantime the offer stands. Where is the editor of a journal or periodical, opposed to the protective policy, who will lay before his readers Mr. Carey's argument in its favor, on the condition that the answer thereto shall be presented, column for column, and page for page, in a journal or periodical of equal standing and circulation on the other side?

Since writing the above, we have found in the same paper (the *Ledger*) the following article, that we lay before our readers as a specimen of free-trade reasoning:—

The United States have sent to England, for the present year, down to the 17th June, the following quantities as compared with the same period last year:—

	Bbls.	Wheat bu.
1850, - - - -	307,015 - -	430,329
1851, - - - -	1,018,869 - -	944,830

The excess of export is equal to 730,000 bbls., worth nearly three millions of dollars. So much for free trade. What would our farmers do with this large surplus, and what would be the price of flour and wheat, should we return again to a high tariff, and so cut them off from the market of the world?

The domestic consumption of wheat and of flour has fallen with the closing of the mills and furnaces of the Union, and the miners and furnace-men, and the builders of furnaces and mills, and the workers in cotton and wool, are every where being compelled to become competitors with the farmer in the production of food, instead of being his customers for the consumption of his food. The necessary consequence of this is, that the price of wheat and of flour has fallen to the point at which it can go abroad, and the learned Theban who indites these free-trade articles sees great advantage to the farmer from such a state of things. He inquires what would our farmers do without this great market of the world, knowing that the price of a barrel of flour in Liverpool, freight and duties and commissions paid, is but about four dollars and a half, and knowing that by the protective tariff of 1842 the production of iron grew in amount six hundred thousand tons, worth, in the various forms in which it was consumed, *sixty millions of dollars*, all paid to the farmer for food for the men who mined the coal and the ore, and food for the men who built the furnaces and the rolling mills and the shops and the houses for the workmen, and food for the people who

made the clothing, and for the raw materials of every kind required by the people who performed all the various processes in the production and manufacture of this iron which owed its existence to the tariff of 1842. The policy he advocates has closed the furnaces and the mills, and *compelled* the farmer to seek a foreign market, and he finds in the miserable market here described compensation for the destruction of a great market that was growing at the rate of *more than twenty millions of dollars a year*, among the people who produce fuel and cloth and iron to give in exchange for food. He desires to know what the farmer would do under a protective tariff, and we will tell him. They would raise more food with fewer hands. They would put back on the land the refuse of that food, and they would enrich the land instead of exhausting it. They would see tens of thousands, or even hundreds of thousands of people remaining in the East to be consumers of food, instead of going West to be producers of it. They would see the coal trade increase in two years to six millions of tons, and affording a market for twenty millions of dollars worth of food and other of the raw products of the earth. They would see the iron trade increase in four years to a million and a half of tons, affording to the farmer and planter a market amounting to a hundred millions of dollars. They would see the cotton manufacture in three years absorbing a million of bales of cotton, affording to the planter an immense market for his great staple, and enabling him to obtain in the market of Europe *double price* for what he had to export. They would see the country becoming rapidly independent of the "nation of shopkeepers," and rapidly occupying the place among the communities of the world which it is fairly entitled to fill—the first place—instead of continuing, as now, to follow in the train of a nation whose every feeling is adverse to its elevation or improvement, and whose every action is directed by a desire to perpetuate the colonial dependence from which it was the object of the war of the Revolution to free ourselves.

We here repeat the invitation to our contemporary to reprint the comments upon his article, pledging ourselves to lay before our readers whatever he may have to say in answer to them. We trust that he will accept our invitation, and thus prove that he himself believes in the truth of the doctrine he desires to advocate.

HARD TO BEAT.—One would think W. S. KING, Esq., of Rhode Island, not easy to be beaten in any thing that he undertakes. He exhibited a short-horn cow, at the late State Fair and Show at Albany, which was, he says, not thought even worthy to be mentioned by the committee. The public may judge, from this fact, that New-York boasts of cows *what is cows* from the following statement, the truth of which Mr. King was ready to verify by two credible witnesses on the ground. With all who know him, his own word would be all-sufficient:—

The short-horn cow, Flora, the property of the writer, was certified to the committee to have given 1,020 quarts of milk in sixty days, and to have averaged sixteen quarts per day for the next thirty days, and to have given nine quarts on the morning of the show, (she gave eight in the evening;) this in her fourth month, and the beast only four years old. A passing injury to one of her teats considerably diminished her yield during the trial. This is equal to over twenty quarts per day, for a cow six years old, or more.

THE EVILS OF DISPERSION.

The recent floods in the West have been the cause of immense loss and suffering. Thousands upon thousands of farms upon the Mississippi and its tributaries, from Cairo north, were submerged, and their owners compelled to flee to the highlands for their lives. Their crops of course were destroyed—their improvements greatly injured—their stock drowned—their lands in many cases covered with sand; indeed, an estimate of the property lost would amount to millions, and generally speaking, this loss falls upon a class of people poorly able to bear it. The *St. Louis Times* says that five hundred families from Illinois Town and the American Bottom came into St. Louis in great distress. This is but one point among hundreds where the people of the bottoms fled for life and succor.—*Exchange paper.*

There are few facts connected with the history of man more remarkable than is that of the tendency to dispersion over this continent. Every man is flying from his neighbor man almost as if from pestilence. At the West, every paper informs us of the influx of emigrants from the East—farmers from New-England, New-York, New-Jersey, Pennsylvania, and even from Ohio—while at the South-west the migration to the new territories becomes in each successive year more enormous than before. The cause of this is properly explained in a European journal, which describes the agriculture of this country in the following terms:—

> At present, but one principle of farming, with trifling exceptions, prevails. This consists *in exhausting the natural soil with a scourging succession of grain crops; then deserting the land, and going on to fresh territories, which are exhausted and deserted in turn.* Nothing like proper restorative culture is known, and never will be till the enterprise of the settler is stopped in its western progress by the Rocky Mountains or the Pacific. In short, it is cheaper to buy new land than to manure the old; and only when there is no more fresh land to purchase, will the art of farming in America be properly known and practised.—*Chambers' Edinburgh Journal.*

It is cheaper, we are here assured, to buy new land than to manure the old, and it is so for the simple reason that the farmer and planter nowhere make a market on the land for the products of the land. They send their wheat and their corn, their pork and their beef, their rice and their cotton, to a distance, that the food may be there consumed by the men who convert the wool into cloth, rather than adopt the measures required for bringing the spinner and the weaver to take their places by their sides, there to consume the food, and thus enabling them to return to the land the refuse of its products. They are perpetually wasting their capital, and then wasting their time in seeking new capital to be again exhausted, and thus exhausting both their land and themselves.

From the same journal we take the following notice of the observations of a recent traveller in the Union, which we most earnestly commend to the notice of such of our readers as desire to understand the cause of the increasing tendency of man to fly from the neighborhood of his brother man, manifested throughout this country:—

> A repetition of the remark here occurs respecting the method of cropping lands, which is rapidly deteriorating the soil. In one place mentioned, "wheat has been taken from the land for fifty years in succession." *Diminishing and precarious crops are the consequence.* Latterly, the crop of wheat on these exhausted and ill-used lands *has suffered from diseases incidental to plants of weakly growth. Occasionally the crop entirely fails, and the farmer finds to his cost that nature is not to be outraged with impunity.* Still, few think of restoratives. A usual plan is to change the crop; and potatoes, peas, and oats are therefore coming more into use. Already Lower Canada, and some other old settled parts, are under the necessity of importing wheat; and, says Mr. Johnston very emphatically, "the same consummation is preparing for the more newly-settled parts, unless a change of system takes

place. The new wheat-exporting—so called—granary districts and States will by-and-by gradually lessen in number and extent, and probably lose altogether the ability to export, unless when unusual harvests occur.

We would here beg our readers to remark that the total cessation of the power to export wheat is here predicted by an eminent British agriculturist, as being the necessary consequence of the system which looks to sending from the land all the products of the land, in accordance with the doctrine taught in the British politico-economical school, that England should be permitted to retain her present position of "the workshop of the world," and that all the farmers and planters of the world should unite in securing to her a monopoly of the machinery for the production of cloth and iron. The writer continues:—

If the population of North America continue to advance at its present rapid rate—especially in the older States of the Union—if large mining and manufacturing populations spring up, the ability to export wheat to Europe will lessen still more rapidly.

Accurate as are in general the views of our author, nothing could be more inaccurate than those here given. The exhaustion of the land and the destruction of the *power* to export wheat is a natural consequence of the *necessity* for depending on distant markets, in which, and on the road to which, the farmer wastes his labor and his manure. The springing up of "large mining and manufacturing populations" would *diminish the necessity* for looking abroad, and *increase the power* to go abroad with wheat and all other of the products of the soil, because the farmer and planter would cease to "scourge the soil," and the crops would cease to be so "precarious," because his plants would cease to be "subject to diseases incidental to plants of weakly growth." He would obtain twice as much food from the same surface, and with no more labor, and his power to go to foreign markets would increase as the extension of the market on the land diminished his necessity for so doing.

"The diminution in the supply of wheat," says our author, "may be delayed for a time by the rapid settling of new Western States, which from their virgin soils will draw easy returns of grain; but every step westward adds to the cost of transporting produce to the Atlantic border." This cost *must* be paid by the producer, and that such is the case the producer well knows, as may be seen by the strenuous exertions that are being every where made to obtain roads by which to go to market, and by the increase of the value of the land as roads are made. The object of protection is that of enabling the consumer to *come* and take his place by the side of the producer, and thus relieve the latter at once and for ever from the necessity for *going* to the distant market.

The following remarks are deserving of the careful consideration of every man that desires to see an improvement in the condition of the people of the Union and an increase in the power of the Union itself. To all such we would beg to say, that wealth is power, and that no nation can become powerful whose policy looks to scourging the land and producing a necessity for dispersion:—

In their relation to English markets, therefore, and the prospects and profits of the British farmer, my persuasion is, that, *year by year, our transatlantic cousins will become less and less able*—except in extraordinary seasons—*to send large supplies of wheat to our island ports;* and that, when the virgin freshness shall have been rubbed off their new lands, they will be unable, *with their present knowledge and methods*, to send wheat to the British market so cheap as the more skilful farmers of Great Britain and Ireland can do. If any one less familiar with practical agriculture doubts that *such must be the final effect of the exhausting system now followed on all the lands of North*

America, I need only inform him that the celebrated Lothian farmers, in the immediate neighborhood of Edinburgh, who carry all their crops off the land—as the North American farmers now do—*return on an average ten tons of well-rotted manure every year to every acre, while the American farmer returns nothing.* If the Edinburgh farmer finds this quantity necessary to keep his land in condition, that of the American farmer must go out of condition, and produce inferior crops in a time which will bear a relation to the original richness of the soil, and to the weight of crop it has been in the habit of producing. And when this exhaustion has come, a more costly system of generous husbandry must be introduced, if the crops are to be kept up; and in this more generous system my belief is that the British farmers will have the victory.

Of this there can be no doubt. The British farmer returns to his land "ten tons of rotted manure" per acre, and that manure is the soil of Russia and Poland, of Germany, and of this Union. The farmer of Ohio extracts from his land all the capital for which he purchased it, and transfers the same to the farmer of England, and having done so for a few years he then abandons his land and removes to Illinois, and thence to Iowa or Minnesota, "dragging at each remove a lengthening chain;" for, in the words of our most intelligent traveller, "every step westward adds to the cost of transporting produce to the Atlantic border," and yet every year adds to the tendency to fly westward, abandoning the rich bottom lands that would pay so largely for the work of clearing and drainage. In many cases, however, the prospect of working out a rich soil induces the settler to place himself in the low lands, and the consequence is found in the perpetual recurrence of facts similar to those described in the paragraph at the head of this article; their lands are submerged, and they are themselves compelled to fly to the high lands to save their lives, their improvements are destroyed, their stock is drowned, and their lands are covered with sand.

Such are the beautiful results of the system which looks to securing to Great Britain a monopoly of the machinery for making cloth and iron; and it is to relieve the planters and farmers of this country from the taxation of a system so exhausting and destructive that we seek protection to both the farmer and planter in their efforts to draw the spindle and the loom, the hammer and the anvil, to take their natural places by the side of their ploughs and their harrows.

HARVEST LABOR.

THE *Frederick Examiner* says: "Our harvest has fairly set in. The wheat and rye crops are very good, well filled, in excellent order, without blight or injury in any respect. Hands are much sought after, and the general complaint is the want of laborers."

In the immediate vicinity of the farmers who thus complain of want of aid in harvest, are deposits of coal and iron ore unlimited in extent, and there too are to be found numerous furnaces that were built for the purpose of converting the ore, the coal, the limestone, and the food into iron; but those furnaces are now closed, and the people who mined the ore and tended the furnaces have gone West to aid in raising food, when if they had been permitted to remain at home, they would have continued to be consumers of food, and *would always have been at hand to aid the farmer in harvest time.* Combination of effort makes men rich. Dispersion makes them poor. The farmers of Frederick county vote to expel from their neighborhood the millers and furnace-men, and the blacksmiths and carpenters, whose services cease to be needed when the furnace is closed, and then they employ English

miners and furnace-men to make their iron, and their crops sometimes perish in the field for want of aid in harvest. With the cotton-planter it is even worse. He limits his planting because it is useless to plant when he knows that he cannot gather the product. *The loss to the Union from this alone is more than the value of all the merchandise of every description that we receive from England.*

THE NOBILITY OF RUSSIA AND OF AMERICA.

THE private residences of the nobility at Moscow are furnished with unparalled magnificence, and the museums and libraries which they contain surpass in extent many public collections in other countries. In their style of living the nobles display a similar ambition to rival the grandeur of princes. Some of them have as many as five hundred domestics; and in the banquets which they give, the splendor which reigns around is said to equal the sumptuous exhibitions of Oriental courts. But the state of the people at large is little in accordance with these external signs of power and grandeur.—*Exchange paper.*

The description here given of "the style" of Russian nobility might apply *almost* to that of some of the "merchant princes" whose fortunes it is the object of British free trade to build up, and it might be advantageous if the farmers and planters of this country were to study who are the people at whose cost the enormous establishments of our trading nobility are maintained. The bushel of corn or the bale of cotton acquires no value from passing into the store of the merchant at one door and out at the other. The one would feed and the other would clothe as many persons if the merchant had no existence. He adds no value to either. *All that he does is to stand between the farmer who raises the corn and the planter who raises the cotton, and to take a portion of each for negotiating their exchanges*, and that portion they would have saved if they had made their exchanges themselves without his intervention. Nevertheless, while himself producing nothing and adding no value to the things that pass through his hands, he it is that every where accumulates the largest fortunes. Mons. Say informs us that "the butchers, bakers, and porkmen of Paris, are pretty sure to retire with a fortune sooner or later; indeed," says he, "I have it from pretty good authority in such matters, that half the houses and real property sold in Paris and its environs are bought up by tradesmen in those lines." (Political Economy, book ii., chap. iv.) The butchers and bakers are *middlemen* living at the cost of the producers and consumers of food, and if the producer of food could bring the consumers to their sides, fewer middlemen would be required, and both producers and consumers would grow rich. In those countries in which the merchant princes have occupied the most conspicuous places, the democracy have always been the poorest. The trading aristocracy of Rome grew in their dimensions precisely as the people became more and more pauperized. The traders of Venice were princes, but the people were enslaved. England transplants her *Barings* and her *Jones Lloyds* into the House of Peers, as she sends her laboring population to the Alms House, and the dimensions of the palaces of the merchant princes of New-York grow in size with the growth of the wretchedness and the crime by which they are surrounded. The object of the tariff of 1842 was that of enabling the farmer and the planter to bring the market to their doors and to enable them to make their own exchanges. That of the tariff of 1846 is to separate the farmer and the planter from the consumers of their products, and to compel them to aid in building up, *at their own cost*, the fortunes of the merchant princes of the earth.

IRRIGATION.

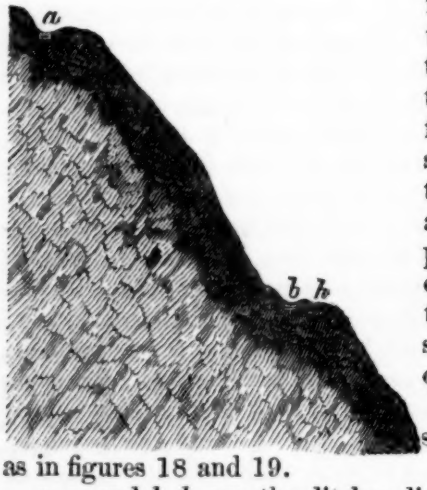
Translated principally from the "Journal d'Agriculture pratique."

BY F. G. SKINNER.

[*Concluded.*]

Hill-side Meadows.—The irrigation of hill-sides and mountain slopes, as practised at Gerhardsbrunn in Germany, is perfectly suited to the present state of American agriculture, and if generally adopted, it would not fail to add vastly to our production of forage. The hill-side to be watered is grubbed, the stones or rocks that can be conveniently moved are carried off, and the land thoroughly cleansed and reduced to a fine tilth. If, after this, slight depressions remain upon the surface which would retain water, they are filled up, and the land is seeded to grass. As soon as a sod is formed sufficiently close to prevent washing, the main irrigating ditch is cut along the top of the field, with a fall of not more than one foot in 3,500. From the main ditch, small trenches two inches wide are neatly cut in the sod, and follow all the sinuosities of the ground, so as to cover as great a surface as possible with running water. If the surface to be irrigated is old field already turfed over, it is best not to break it up; all that is necessary is to remove any impediments to the sweep of the scythe, to cut the main ditch and trenches, and let the water on immediately; the old sod will soon be replaced by grasses of the best quality.

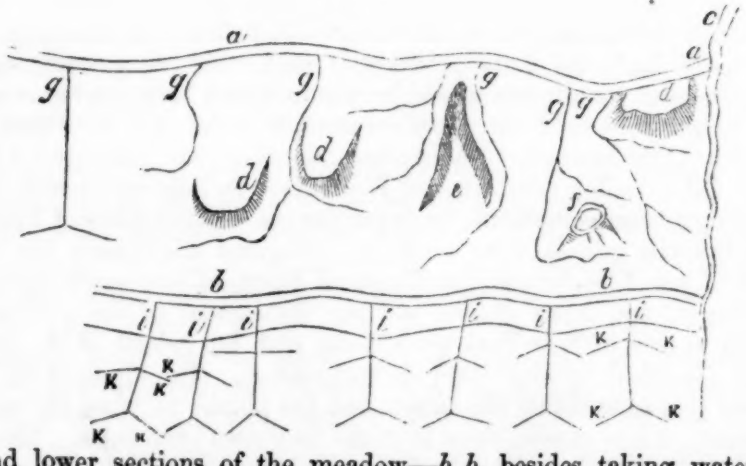
Fig. 18.



If the slope to be irrigated is very wide, a second horizontal ditch should be cut in it, as in figures 18 and 19.

a, *a*, and *b*, *b*, are the ditches distributing the water derived from *c*, to the

Fig. 19.



upper and lower sections of the meadow—*b*, *b*, besides taking water from the stream, gathers that descending from the upper section of the meadow.

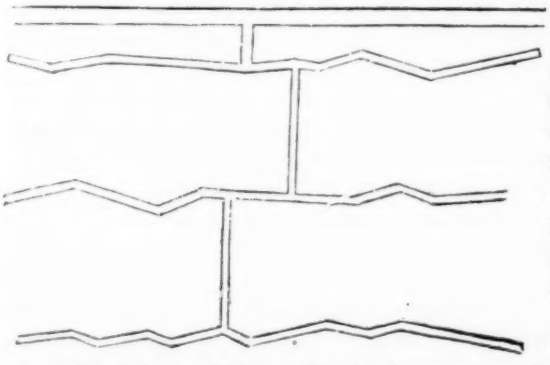
d, *d*, are rocks or hillocks that could not be removed; *g*, *g*, *g*, are the small

irrigating trenches. Below and adjoining the canal *b*, *b*, is a road by which the hay from the upper section of the meadow is carried off.

i, *i*, *i*, *i*, are vertical trenches terminated by the horizontal trenches *k*, *k*, *k*. The road is graded so as to be irrigated and mowed; sometimes it is so arranged that one wheel of the cart runs in the ditch.

Many of the meadows in the district of Gerhardsbrunn are watered in this way; but when in the course of time the eminences are cut down and the depressions in the surfaces filled up, and all obstacles removed, a much better system of irrigation prevails. The bare spots occasioned by cutting down a hillock or filling up a hollow must be sodded or seeded; if there is not enough sod to cover the entire surface, it should be cut into strips and pounded in. The improved irrigation of hilly meadows consists in replacing the irregular cuts by horizontal trenches, which are supplied by a distributing ditch.

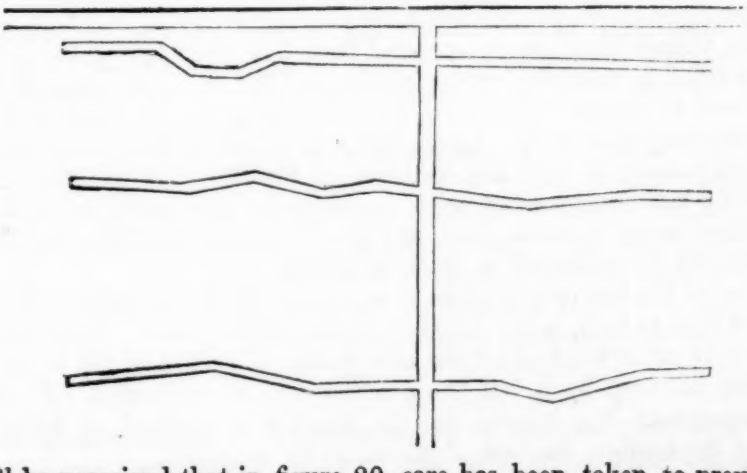
Fig. 20.



The irrigating trenches should be traced by the mason's level. They must be perfectly horizontal, though it is not necessary they should be perfectly straight; on the contrary, they may describe as many curves as the undulations of the surface and the necessity for preserving the horizontal may require.

As before stated, the distance between the trenches depends upon the nature and supply of the water aud upon the inclination of the surface. On this subject it is difficult to lay down precise rules, because it would be necessary to measure the quantity of water and the degree of inclination. In general, however, it is best not to be too sparing of the smaller trenches; indeed, there cannot well be too many of them. On surfaces with a fall of four or five feet in a hundred, the distance between them should not exceed eighteen feet. The irrigating trenches may be supplied from the main canal by a vertical trench, or each irrigating trench may have its own feeder proceeding directly from the main canal, (figs. 20, 21.)

Fig. 21.

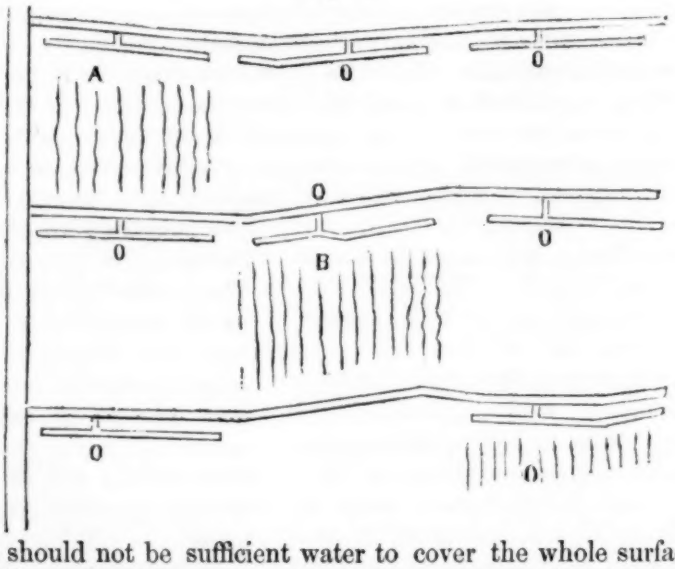


It will be perceived that in figure 20, care has been taken to prevent the vertical trenches from corresponding directly with each other; because, if the

fall (as is supposed in this case) is rapid, these vertical trenches would form a continuous straight line, and the increased action of the water in consequence would soon wash the land into gulleys.

A better arrangement is to furnish each irrigating trench with its own trench of supply, as in figure 22.

Fig. 22.



If there should not be sufficient water to cover the whole surface at once, it is cut off from the different trenches at the points marked O, (an ordinary shingle will answer the purpose,) and only portions of the meadow, as at A, B, C, are irrigated, and the water may be shifted at will, from one spot to another, merely by moving the shingles at O.

General Directions.—The degree and duration of an irrigation may be modified by several causes. Thus, water naturally suited to the purpose may be applied throughout the whole winter, if the cold is not so great as to congeal it. Water of indifferent quality should not be used in winter, unless the meadow is manured. At a short distance from their source, the temperature of nearly all waters is favorable to vegetation, and they may therefore be used at all seasons. The effects of irrigation are also much modified by the seasons, and, as a general rule, autumn waterings are to be preferred; they renew the vigor of plants exhausted by previous cropping, the turf becomes closer, the young plants newly sprouted from the seeds left by the first crop are invigorated to resist the coming winter, and the whole meadow, as it were, clothes itself to encounter the cold, and in early spring the grass starts forth more flourishing than ever. Again, in the fall, water is more abundant; it is more highly charged with the elements of fertility; the ploughed grounds manured for the autumn-sown crops contribute to its richness, and at this season ordinary water becomes good, and good becomes excellent, and the irrigation should be prolonged as much as possible.

As soon as the last crop of grass is removed, and the wounds of the scythe have had time to heal, is the moment to turn on the water. But this is often postponed, in order to graze off the after-math: a portion of the winter provender may be saved by it, but the practice is to be deprecated, for not only is the subsequent crop injured, but the meadow is deprived of water in the month of September, the best of all others for irrigation.

The first waterings may be prolonged for three weeks, or even a month; after each, the meadow should be allowed to become dry. Under all circum-

stances of soil, season, or climate, it is essential the meadow should drain itself easily and rapidly ; for without it, the good effects of irrigation are lost. If the autumn is warm, the waterings must not be of long continuance, and as soon as a little scum or foam is perceived on the grass, they should cease ; to be renewed as soon as the meadow becomes dry. If the water is of the best quality, the irrigation may be continued throughout the autumn, as long as the weather does not become too cold, but the periods of irrigation should be diminished, while those of draining are increased.

In winter, all irrigation with indifferent or bad water should cease, unless the land be well manured, in which case it may be prolonged, until interrupted by hard frost or snow ; and even then, if the quality of the water be good, the temperature high, and the land of easy drainage, there can be no objection to let the water run under the ice ; it is in no danger of freezing, and the turf over which it flows remains green and continues to grow.

If the irrigation has been suspended in winter, the first that is given after the weather moderates should be prolonged ; but the duration of those following must diminish as the season advances until May, when they are usually suspended, particularly if the water is muddy, for it may then "foul" the grass, when nearly ready for the scythe. Another precaution to be observed is, never to turn or take off the water at midday, particularly under a bright sun ; evening is the favorable moment.

The most beneficial irrigations are those given in cloudy and rainy weather. With warm rains and southerly winds, herbaceous vegetation acquires great activity, and the growth of grass is rapid, and should the rain be cold, the brook water tempers its chilling effect upon the meadows.

Late spring frosts are to be dreaded, and all irrigation must cease when they are threatened. After the weather moderates, a few days' watering will repair, in a great degree, any damage that may have been done. If, however, there be an abundance of water at command, a full flow during the prevalence of frost will prove an efficient protection. The water is usually let on in the evening, before the dew falls, or in the morning, after it disappears. There is no reason assigned for this, but it is the usual practice.

Both the extremes of heat and cold are to be avoided during the irrigation ; and if, as before stated, it may go on with suitable water when the thermometer falls one or two degrees below the freezing point, it is on the express condition that the water runs off freely ; for wherever sheets of ice remain in contact with the turf for some time, the shallow-rooted plants will perish, leaving none but those with deep roots, and of little value.

In rainny seasons the object of irrigation is to fecundate, and not to give moisture ; it may therefore be abundant with good water, and should be very slight with that which is bad.

Nature of the Soil.—Varieties in soil induce modifications in its irrigation. Thus, light sands and gravel require longer and more frequent waterings than heavy clays, and these last require a longer time to drain. Inclination of surface is another modifying cause. A light soil, with little inclination of surface, should not be so long or so often under water as if it were much inclined, and a steep clay surface can receive more than a level one. The appearance of scum or foam upon the sod is an indication of suffering in the roots of some of the plants, and is a warning to shut off the water.

The abundance and duration of an irrigation should not be controlled by the vegetable surface alone, for frequently beneath a shallow vegetable surface an impervious clay is found, in which case the watering should be moderate ; if, however, the subsoil be gravel or sand, the irrigation may be more abundant.

Location and Exposure of Meadows.—The site of a meadow has an important bearing on its irrigation: thus, a sloping surface or a southern exposure requires more water than a level surface or a northern aspect. It may be remarked that meadows facing the south, though earlier than others, and producing better forage, are more liable to injury from late frosts, and it is best where the climate is variable not to force them by premature watering. Eastern should be more moderately irrigated than northern exposures, because vegetation is more active upon them, and they are more liable to white frosts. A western, being warmer, requires a little more water than an eastern aspect: and, finally, latitude is a serious consideration, since a southern evidently requires more water than a northern climate.

It may be objected that the wonders wrought by irrigation in Italy, Spain, and other southern countries, are to be attributed to climate, and that the system would not confer equal benefits upon the agriculture of the United States. To show how groundless such an objection would be, it will only be necessary to cite results obtained in England and Scotland, countries where the farmer has to contend, not with parching droughts, as in America, but with too much moisture.

Coleman, in his "European Agriculture," states that the most extensive and finished works of irrigation, or, as they are called there, *water-meadows*, to be found in England, are at Welbeck in Nottinghamshire, at the residence of the Duke of Portland. They considerably exceeded three hundred acres, and were being extended at the time of his visit. These meadows receive no other manure beyond that furnished by the water, yet *every acre, in its produce consumed by cattle on the farm, supplies manure for five acres of other land.* Corringham's Report of Nottinghamshire, alluding to these meadows, states that their annual value had been raised from £80 to £3600. The water-meadows at Audley End farm are described by Mr. Colman as being formed of old pasture without disturbing the sod, and as yielding in two anuual cuttings six tons to the acre. The same author concludes his description of the irrigated meadows he saw in England thus:

"I shall close this part of my subject with the remarks of Philip Pusey, Esq., M. P., which are always deserving the highest attention, and which are as applicable to many parts of the United States as to those places to which they immediately refer:—'I have known Mr. Roals' farm for many years. It stands alone on the wild Exmoor range of mountain land. If any one asserted that, for a trifling outlay, he could enable heath-covered steeps to rival, in produce and value, the old grazing grounds of Northamptonshire, he would be regarded as a dreamer. But if any owner of moors will visit Somerset or North Devon, he will ascertain the literal truth of the statement, as I did five years ago. All that is required is a streamlet trickling down the mountain side, or a torrent descending rapidly along the bottom of the glen. *The profit of under-draining old arable land appears trifling when compared with the profit of thus forming water-meadows;* which, according to Mr. Roals, is more than one pound interest for two pounds invested.'

"The two pages of this report, which state no more than Mr. Roals himself has done, contain a talisman by which a mantle of luxuriant verdure might be spread over the mountain moors of Wales and Scotland, of Kerry and Connemara. New-England especially, and many parts of the other States, are full of sites and means for such improvements, and in many cases the expense of labor and levelling the land, bringing the water into a body and placing it under control, would be met many times over by the profits of such improvements."

The account given by Mr. Colman of a system of irrigation with the sewerage water of Edinburgh is exceedingly interesting; and though by no means of general application, it is inserted here entire, with a view of showing how immensely valuable to agriculture would be the wash of our own cities, if, as in the Scotch capital, it were turned to account.

"I come next to speak of a system of irrigation established in Edinburgh, which I looked at with a good deal of interest, where the sewerage water from the drains of the city is applied to grass lands in its neighborhood, which by this means are rendered most extraordinarily productive.

"The drainage water from a large portion of the city of Edinburgh is collected into covered carriers and drains, and from these emptied into a stream of water, very properly, as one may suppose in such a case, called the *Foul Burn*, the term *burn* being the Scottish name for a small stream or brook. Here it passes along in an open brook, among some flat lands, which by proper arrangements it is made to overflow. I should state that, before it reaches the places where it is thus diffused, it is received in tanks, where the more solid parts are deposited. It does not require any extraordinary acuteness of smell, on approaching these irrigated lands, to become satisfied that the waters, even after passing from the cisterns or tanks, are sufficiently charged with odoriferous particles held in suspension.

"This water thus received is diffused over three hundred acres of land; and these lands are rendered productive to a most extraordinary degree. One of the principal proprietors, who held his land under a long lease, at a rent of £5 per acre, and sub-let this irrigated land at £30 per acre, informed me that it was sometimes cut seven times in a season. The grass is carried into the city, a distance of two and three miles, for the support of the cows which supply the city with milk. Different channels or gutters are made for the water, so that the whole may be flooded. It is applied generally after every cutting, where the situation admits of it; but it is found advisable not to apply it immediately upon the grass being cut, nor before it has obtained some small growth.

"The offensive exhalations from meadows thus treated have been the subject of prosecutions at law. In the testimony adduced on these occasions, it has been stated that the rent for which some of these meadews are leased in small portions to cow-feeders varies on an average from £20 to £30 per acre. Some of the richest meadows were let in 1835 at £38 per acre; and in that season of scarce forage, 1826, £57, or $285, per acre, were obtained for some meadows. The waste land called *Figget Whins*, containing thirty acres, and ten acres of poor sandy soil adjoining them, were formed into water-meadows in 1821, at an expense of £1,000. The pasture of he Figget Whins used to be let for £40 per year, and that of the ten acres at £60. Now, the same ground, as meadows, let for £15 or £20 an acre per year, and will probably let for more, as the land becomes more and more enriched; that is, land which before the irrigation let for about $500 per year, now, under this improvement. yields an annual rent of from $3,000 to $4,000. The irrigation is continued at different times, from the first of April to the middle of September. The parties interested in defending the use of this water for irrigating these lands, maintain that the grass produced in these meadows by this process supports in Edinburgh 3000 cows, and in Leith 600 cows. It is added, 'that the parties interested in the lands estimate the compensation which would induce them to discontinue the practice at £150,000, or $750,000. This is stated as the sum which the proprietors at the west side of the city would be entitled to, exclusive of those at the east, were the practice abolished by Government.'"

It is to be hoped that the results of irrigation above described and vouched for by Mr. Colman, will be sufficient to awaken the American farmer to the incalculable value of the system, and induce him to put in practice the simple rules laid down in this essay.

LECTURE ON HAIR, WOOL, AND SHEEP BREEDING.

THE following interesting lecture upon the new science of "Trichology" was delivered in this city, a few days since, before the "Central Southern Rights Association of Virginia," by PETER A. BROWNE, Esq., LL.D., of Philadelphia. It has been furnished to us for publication at the instance of friends who, having heard it themselves, were unwilling that a paper so full of curious and profitable matter should be kept from the public. We need not say that we are happy that our pages have been made the medium of its publication.

The lecture abounds with curious and valuable information upon a subject of great importance and intimate concern to every farmer, and to the welfare of the State at large—wool raising and wool manufacturing. It also possesses another recommendation, which we cannot refrain from noticing, viz.: It is almost entirely freed from *scientific technicalities*, which few readers can comprehend, and is couched in plain English phrase that all who peruse can understand. We trust every reader will give it careful attention, believing that no one can do so without being amply repaid.—*Southern Planter.*

LECTURE.

Nothing which belongs to the study of nature is insignificant. The naturalist surveys, with interest, *all* the works of the GREAT CREATOR;—with the telescope, he measures the parallax of the distant stars, and with the microscope, he examines the minutest part of the smallest leaf, crystal or infusoria. Nothing for him is too large,—nothing too small, which God has placed within his reach. If that Mighty Being who created the heavens and the earth did not consider it beneath *His* dignity to make so minute as a microscopic object, surely it would be great presumption in man to consider it too small for his examination. We are, therefore, of opinion that making collections of pile, and examining hair and wool under the microscope and with the trichometer,* are exceedingly interesting.

The natural history of man has, within the last ten years, attracted more attention than at any former period of time. It is not to be wondered at, that we should be desirous of knowing the *race* from which we and our immediate ancestors sprung; but, as almost all very ancient history is involved in fable, it often happens, that no positive testimony as to the origin of nations can be obtained; wherefore it is proper and laudable, by fair arguments, founded upon circumstances, to assist the archæologist in his valuable researches. To do this the ingenuity of modern times has pointed out several methods. Professor Samuel G. Morton has chosen the department of craniology. With great industry and perseverance, he has collected a vast number of human skulls, of all nations and of all ages; and by their examinations, by the measurement of their facial angles, and by ascertaining the capacity of the cavity for the repository of the brain, he has drawn certain conclusions, which have been published, and read with great interest. Professor Samuel S. Haldeman has spent much time in studying the mechanism of the organs of speech, and in a series of very interesting lectures, delivered before the University of Pennsylvania, has laid down rules by which it may be discovered, from the national method of pronouncing certain sounds, which people are allied and which are not, and even which race is the oldest. Mr. Flourence, a celebrated French naturalist and anatomist, has devoted his energies to the scrutiny of the human skin and its coloring matter; showing wherein they agree and wherein they disagree, in the different

* An instrument invented by me to ascertain the ductility, elasticity, and tenacity of a fibre at a single operation.

races. Other writers have taken an account of the customs, manners, and even the prejudices of men, to discover their national connection. I have made an extensive collection of national pile, both ancient and modern, and by studying the shape, direction, inclination and organization, am enabled to divide the whole human family into species.

All these studies are intensely interesting, especially as it is evident that it is upon the combined evidence, to be adduced from the whole of them, that the question of races must, ultimately, be determined.

The peculiar state of the hair of the head, and often of the body and limbs, likewise, is intimately connected with the *health* of the individual. All cutaneous diseases affect the pile, in a greater or less degree; besides which, there are *diseases of the hair*, some of them of a most frightful character, as for instance, plica polonica, favus, &c. &c. To understand these diseases perfectly, the physician should examine the condition of the pile, and particularly of its root, before he makes out his diagnosis. But no physician can be a competent judge of a *diseased* hair, if he is unacquainted with the character of a *well* one.* Hence it is obvious that the medical student, and even the medical practitioner, is benefited by studying the organism and properties of these integuments. Fortunately I have made a collection, not only of diseased hair, but of the hair of the sick and diseased; which I have examined myself, and submit to the inspection of those who take an interest in such subjects.

I think that there is difference between the hair of the sane and that of the insane; and, with a view to test the accuracy of the position, I have made very large collections of the covering of the head of the last named unfortunate fellow-beings, in no less than five lunatic asylums in the United States, including those sufferers of every variety and stage of that infirmity. To the physician and philanthropist this is a most interesting cabinet.

This is not a tithe of the contributions that the new science of "TRICHOLOGY" has made to her sister sciences, but we must speak of her assistance to the *arts*.

How is it with AGRICULTURE? Is sheep breeding and raising important? If history tells the truth, there never has been a nation which has fostered it, that has not become opulent. Let others talk of the gold mines of California; our theme is the *golden fleece!* To glean a few grains of metal at the former, hundreds and thousands of our countrymen have sickened, pined, and perished in a distant land, who would have been better, far better employed, in a healthy climate, feeding and tending their flocks; and who, while enriching themselves, would have added to the national prosperity and independence.

Cotton was grown in Georgia as early as 1787, but was not seriously thought of as a great American staple until about 1790. From Oct. 1st, 1790, to Sept. 30th, 1791, the United States exported 189,316 lbs. of cotton. In 1835, the lands used in the United States for the cultivation of cotton were estimated at three hundred and twelve millions of dollars. Sheep breeding, for fine wool, dates as late as 1800, and yet it would not be hazarding too much to say that, even now, the raising of sheep and the wool interest are as important in the United States as was the cotton interest in 1835; and I venture to predict, (let who will sneer at it,) that in thirty years from this time, *wool will become as great an American staple as cotton.*

Until the census is published, we have no very accurate means of ascertaining what is the number of sheep in the United States; but we suppose it may safely be put down at thirty-five or forty millions. Now if we value these at two dollars apiece, which, considering that individuals of good breed are often sold for several hundred dollars, is moderate enough, we have seventy or eighty millions; then if we add three shillings per head for the land and buildings necessary for their shelter and support, we have one hundred and five to one hundred and twenty millions. But there are many persons who hear me, who, recollecting with what avidity every thing was received, in 1835, that was calculated to improve the growth of cotton, will be at a loss to discover why what is advanced by trichology, in regard to breeding and raising sheep and improving the quantity and quality of wool, is now heard with such apparent indifference. Is the examination of a subject which regards thirty-five or forty millions of domestic animals and one hundred millions of real estate so insignificant?

The General Government through the Patent Office, a few years since, sent a special agent to Europe to collect specimens of all the fine wools. He brought back with him samples from Russia, Hungary, Silesia, Prussia and Saxony. They were divided into parcels and sent to the Governors of the different States. The one sent to Pennsylvania lately came to my hands. I measured the wools and compared them with the growth

* Example, the crisped state of oval hair in plica polonica.

of our own country, and had the pleasure of announcing what had never before been known, or even *suspected*, viz.:

THAT WE CAN RAISE AS FINE WOOL IN THE UNITED STATES AS ANY COUNTRY IN THE WORLD, AND FINER THAN ANY EXCEPT SAXONY.

This important information, showing that the United States has it in her power to create *another great staple*, equal in importance to her cotton, was published in "The Plough, the Loom and the Anvil,"—was read,—has never been contradicted,—and is now almost forgotten!

Let us now examine this subject in another point of view. Let us assume that the number of sheep in the United States is thirty-five millions. In Germany the average annual produce of fleece is put down at a trifle over two pounds. In England, where the wool is coarser and less valuable, the average is four pounds. Our average is put at from two and a half to two and three quarters; but I am persuaded that it is underrated, for I have in my cabinet specimens of fine wool, grown in the United States, from three and a half to four and even as high as five pounds. But suppose we say three pounds; this will give us an annual produce of one hundred and five millions of pounds; which, at forty cents a pound, will make forty-two millions of dollars. And observe, that in this calculation nothing is said about the increase of lambs. The annual production of all the gold and silver mines of North and South America was estimated by Baron Humboldt at nine millions of pounds sterling; at present, (except the recent discoveries in California,) it is less than five millions of pounds or twenty-five millions of dollars.

Mr. Hughes, a London wool broker, upon his examination before the House of Lords, in England, in 1828, on the subject of wool and woollen manufactures, thus delivered himself:—

"Other countries are making rapid strides to compete with us, [England,] particularly North America. Within the last twelve months there have been upwards of five thousand bags of *foreign* wool shipped from the port of London alone for that country, for the purpose of being manufactured. They [the people of the United States] are now making very rapid strides, and I have no hesitation in believing that, in a few years, they will be independent of us for *coats*, as they now are for *hats*."

I did every thing within my power to have our fine wools exhibited at the World's Fair; had I succeeded, the House of Lords might have learned that Mr. Hughes was a *prophet*, and that the time *has* arrived when the American people can not only be independent of Great Britain for their own coats, but that they can furnish wool, of the growth of the United States, fine enough for the most fastidious of Europe.

England cannot raise the fine wool required for manufacturing broadcloths. Lest we might be suspected of prejudice, hear what is written by *one of her own subjects*.

In "The Industrial Resources of Ireland," by Robert Kane, M.D., honorary member of the Royal Dublin Society, &c., we find the following: "The woollen manufacture has been, at all periods, considered as of high importance in this country [Ireland;] so that, at certain times, it was deemed necessary [by England] to take measures to *moderate its prosperity*. [!]* A very large quantity of wool is grown in Ireland, the total number of sheep being 2,091,199. A great deal of this is sent to France, where it is manufactured into 'mousseline de laine.'" After noticing the difference between wool that will felt and full, and fleece [hair] which will not, he proceeds thus: "In moist, cold climates, such as the British islands, the *natural* wool is, universally, long stapled and *unfit for felting;* whilst in dry climates, with hot summers, the wool is short stapled and *felts strongly*. The wool produced *not merely in Ireland*, BUT IN ENGLAND also, is thus *exclusively adapted to the worsted trade*. For woollen cloths and similar goods the wool *is imported from the Continent*. It has often been an object with the English woolgrowers and landed proprietors to *produce this felting wool in England*, and thus get rid of the necessity of purchasing abroad; BUT IT HAS BEEN FOUND IMPOSSIBLE, AFTER THE MOST EXPENSIVE EXPERIMENTS, in *importing sheep of particular flocks*. It has been found that in two or three generations, of *even the pure breed*, the influence of the climate and food *totally changed the character of the wool*, and brought it to the same quality as that of the native animals."

We repeat, then, without fear of contradiction, "England cannot produce the fine wools required for manufacturing broadcloths," but she will continue to manufacture these cloths as long as she can find sale for them; consequently she must import fine wool from some other country. Why should not *this* country be the United States? Why not Virginia? Can any one give a reason? If we can produce as fine wool as any

* This puts us in mind of British writers talking of the *arrogance* of New-England in attempting to manufacture.

other country, why may she not import our *wool* as she does our *cotton?* How will it be if we can produce *finer* wool than any other country? And we can produce finer wool than any except Saxony.

Perhaps some may imagine that even if they did take our wool, it would be of small account; let such persons read the following document:

Amount of Foreign Wool imported into England from 1801 *to* 1805, *inclusive.* (*From Fisher's Industrial Record, vol.* 1. *p.* 207.)

Year.	lbs.	Year.	lbs.	Year.	lbs.
1801, - -	7,371,774	1815, - -	13,640,375	1829, - -	21,516,649
1802, - -	7,669,798	1816, - -	7,517,886	1830, - -	32,305,314
1803, - -	5,904,740	1817, - -	14,061,722	1831, - -	31,652,029
1804, - -	7,921,595	1818, - -	24,749,570	1832, - -	28,142,489
1805, - -	8,069,793	1819, - -	16,100,970	1833, - -	38,076,413
1806, - -	6,775,636	1820, - -	9,775,605	1834, - -	46,455,232
1807, - -	11,487,050	1821, - -	16,622,567	1835, - -	42,604,656
1808, - -	2,284,482	1822, - -	19,058,080	1836, - -	64,239,977
1809, - -	6,758,954	1823, - -	19,336,725	1837, - -	48,379,708
1810, - -	10,914,137	1824, - -	22,564,485	1838, - -	52,606,196
1811, - -	4,732,782	1825, - -	43,816,966	1839, - -	57,364,772
1812, - -	6,983,575	1826, - -	15,989,112	1840, - -	52,959,221
1813, records dest. by fire.		1827, - -	29,115,341	1843, - -	49,343,093
1814, -	15,492,311	1828, - -	30,236,059	1845, - -	65,079,524

Vast as this consumption appears to be, the United States has the capacity to supply it, after all our own manufactories are supplied; and one would think that it would be highly gratifying to the owners of unseated lands in the United States, in Virginia, to have it proven to them, that they can be turned into sheep-walks, and thus rendered exceedingly productive to their proprietors, and beneficial to the nation. We wish all our hearers could examine my specimens of the *finest kind of wool*, raised upon old, worn-out, tobacco lands, in Bedford county, Virginia. They far surpass any fleece that England ever has, or ever can produce, and will not lose by a comparison with the finest wools of the most favored country on the continent of Europe. Messrs. Robert Allen, Stuart Paterson, H. W. Chaplin, Thos. Patterson and Robert Kelso, and others, the producers, deserve a vote of thanks from the Virginia Legislature, for their exertions to improve this branch of American industry.

But let us not forget that sheep breeding and raising, to be prosperous and profitable, must be pursued with *some degree of art.* A plain, unsophisticated witness was once asked in court, "*what he followed?*" He answered that it was "*the art* of ditching." This man was right, for there is *an art* in every occupation, not excepting even the digging of a ditch.

One portion of the *art* of sheep breeding consists in selecting the *proper breed of sheep for the particular location of the farmer.* We have already seen that neither England nor Ireland can raise *the fine-woolled sheep.* Doctor Kane says that it has been found to be *impossible*, after the most expensive experiments. He attributes the failure to *climate* and food. The *natural* food depends upon the *soil* and climate; so that he might have said "*soil* and *climate.*" If it depends upon *climate*, it is fortunate for us, that in this widely extended continent we have almost every variety of it; but still, it is a most important point for the farmer to know which breed of sheep will thrive best and produce the finest wool, in the particular district where Providence has cast his lot. And we confess that upon turning over the leaves of the volume of the Cabinet of American Wools, we were forcibly struck with the correctness of the remark first made at the late Pennsylvania Agricultural Convention, that two parallel lines might be drawn over the map of the United States, including within them the geographical (and perhaps the geological) district best calculated for rearing *the fine-woolled sheep.* We also remarked that there was another extensive district of our country, easily pointed out, which is admirably calculated for raising the fleece which, in England, is called "*long wool*," but which is properly "*hair.*" If this information turns out to be correct, (if it is so only to a limited extent,) then my collection of wools, made for a different purpose, will have shed more light upon the connection of climate and soil with wool growing, than all the learned disquisitions and opinions that have ever made their appearance before the public. Two things, we think, are certain: 1st. That the wool staplers and manufacturers will find it to their interest to consult this record, for the best information where they

may find the finest fleece; and 2d. The new beginner in sheep breeding may also there learn where to apply for the best breeds.

But, perhaps, after all that has been said, some persons may believe, that while this information may be well enough for the *sheep breeder and wool manufacturer*, to the public in general it is comparatively useless. But the true patriot, particularly if he be a politician, (in the proper sense of that word,) is deeply interested in knowing what are *all* the great and leading interests of his country.

Every moral, sensible and well educated citizen has a right to expect that he will be, at some period of his life, called upon to act as a member of one of those deliberative bodies that make laws for this free and happy country; but how can he, *understandingly*, give his opinion upon a measure connected with the industrial interests of the country, unless he possesses, at least, a general knowledge of the subjects alluded to in this paper?* Besides, in an economical point of view, does not every man, and even every *woman*, wish to know why it is, in these modern times, that having paid a high price for flannel, and having been subjected to the expense of making it into a garment,—that after having been sent two or three times to the laundress, it has shrunk so much as to be almost, if not entirely, useless? Would it not be a comfort to know *why* the Welsh flannels (formerly held in such high repute) have so depreciated? and to be assured that we have the capacity of producing, in the United States, a *wool that will not shrink?* The author of the "Industrial Record," speaking of Thompsonville, in Connecticut, says that they manufacture carpets, annually, to the amount of 480,000 yards. To enable them to do this, they use 1,000,000 and upwards of pounds of wool, all of which is, he says, imported from either the Mediterranean or South America. But I contend, (and you agree with me in this opinion,) that EVERY POUND OF THIS WOOL OUGHT TO BE RAISED IN OUR SOUTHERN STATES. The sheep that produces *that* fleece thrives *there*, and its breeding and raising, from Delaware to Georgia, would be a source of immense profit.

But here we feel called upon to notice an error into which the editor of the work above quoted has, inadvertently, fallen. He asserts that the importation of the Mediterranean and South American wool, at seven cents a pound, does not interfere, in the slightest degree, with the domestic wool grower, who, he says, cannot afford to raise wool at so low a price, when, with the same food and expense, he can raise fleeces worth, on an average, thirty cents a pound. But he seems to have been entirely unaware of the fact, that the *places* where these hairy fleeces can be grown are unfit for the breeding and raising of the *fine-woolled sheep*. He seems also to have lost sight of the fact, that the sheep, whose wool is worth, as he says, thirty cents a pound, produces, on an average, only three pounds of fleece; whereas of the hairy fleeces, bred in the United States, I have in my cabinet specimens that produced 17½ lbs. Now a schoolboy can cipher this out, to show that this latter wool is the most profitable:

3 lbs. of fine fleece at 30 cents,	$0 90
17½ lbs. of hairy fleece at 7 cents,	1 22½
Balance in favor of the hairy fleece,	$0 32½

To raise one million of pounds of fleece at 3 lbs. a sheep would require 333,333 sheep.

But to raise one million of pounds of *hairy* fleece, at 17½ lbs. per sheep, would require only 57,140 sheep.

Difference, 76,193 sheep, the feeding and taking care of which would cost $171,420.

Our brethren of the eastern parts of the Southern States should, therefore, turn their attention to breeding and raising *the hairy sheep;* and Congress should encourage them to do so, by laying a duty on foreign wool, though worth only seven cents a pound.

There is a woollen mill in Lowell, Massachusetts, (the Middlesex Company.) Their wool comes from the States of Vermont, New Hampshire, New-York, Ohio, Penn-ylvania, Illinois, Missouri and Wisconsin. The quantity of cloth there manufactured in 1845 was equal to the produce of 400,000 sheep. The broadcloths and cassimeres annually made exceed 114,000 yards of the former, and 620,000 yards of the latter, and the sales exceeded $800,000 per annum. And there is no reason why the city of Richmond should not follow the example.

The area of this State has been variously stated from sixty-five to seventy thousand square miles, exceeding that of England and Wales, which, together, are only fifty-seven thousand eight hundred and twelve; yet *they* have a population of ten and a half millions, and raise thirty-two millions sheep! The total area of the six New-England States,

* The members of the Central Southern Rights Society of Virginia have solemnly pledged themselves, to each other, and to the people, to foster articles of home growth and home manufacture; it has therefore become their *duty* to investigate this subject.

viz.: Maine, New-Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut, is only sixty-three thousand and twenty-six square miles.

The climate of Virginia, though various, is, in general, good. It lies between parallel lines of latitude, which, on the old continent, include Morocco, Syria, Asia Minor, Greece, Sicily, Naples, and the southern part of Spain. Some of these places are famous for producing fine *hairy*-fleeced sheep, and one of them, at least, viz., Spain, is renowned for rearing the fine-*woolled* Merino breed.

The citizens of Virginia, descended from the hardy and liberty-loving Saxon race, are peculiarly an agricultural people; their great staples have been, hitherto, tobacco, wheat, Indian corn, and in the southern part of the State, cotton; but they *must*, at no distant day, make *fleece* one of their *great staples*. Providence has so decreed it, and, therefore, the sooner it is accomplished the better for the community. I am prepared to prove by specimens that *Western* Virginia can produce as fine *wool* as Saxony; and I have not a doubt but that, in regard to the *hairy fleece*, *Eastern* Virginia will be able to compete with, if not excel, the Mediterranean and South American fleeces.

The easy means of transit of the former of these productions to *Richmond* by navigable streams and artificial means, points out *that* city as the emporium of this valuable commodity; and the exportation of it, either in a raw or in a manufactured state, will greatly improve the commerce of the metropolis.

But this is not all. *Richmond* is destined to become one of the greatest *wool manufacturing* places in the Union. Let us take a *comparative* view of her *water-power*. As Paterson is one of the best known and most appreciated, we will commence there.

Paterson has a fall of sixty-six feet, which is capable of being used three times. The amount of cubic feet of water per second is thirty, on an average of two and a half feet of head discharged from the side of the fore-bay, the bottom of the aperture being three feet. One square foot, drawn in this way, is estimated as equal to a thirteen-horse power; so that the horse-powers may be put down at 1170.

Now, counting 225 spindles to a horse-power, Paterson has a water-power only sufficient to drive 261,251 spindles, or their equivalent.

The James river at Richmond, in 1849, was gauged by Mr. E. H. Gill, a skilful engineer, who found the discharge to be 2,444 cubic feet per second. The fall of the first three miles is eighty-one feet.

Now, if we adopt the same rule for this place as for Paterson, allowing three falls, of twenty feet each, and admitting the average head of two and a half feet, an aperture of twelve square inches will discharge eight cubic feet per second, which will make the James river power, at its lowest stage, equal to 2,673,375 spindles.

To this immense amount of water-power Richmond can add her inexhaustible supply of fuel. Virginia coal, equal in quality for all manufacturing purposes to any found in England, may be had in Richmond for three to three dollars and fifty cents a ton, cheaper than any part of England. The appropriation of a portion (a small portion only) of the water-power of Richmond to the *manufacture* of the *wool* grown in her own *State*, would not only encourage a large portion of their farmers and planters who raise sheep, but would feed and clothe a portion of the *city population*, by employing them in and about the manufactories.

In this country this is a very desirable employment, for while in England a male spinner in a woollen mill receives only ninety-four cents, and in France from forty to fifty-nine cents, in the United States he receives one dollar and eight cents.

At the same time the necessaries of life are twenty-five per cent. cheaper than in England.

The objection to manufactories, as injurious to the *morals* of the operatives, has been so triumphantly contradicted by the history of Lowell, that at this day nothing need be urged upon that head.

But every projected operation which may act upon the *health* of the community, deserves to be strictly inquired into; and we think that, considering that in a country like this, where temperature is so continually and so materially changing, for the greater part of the year every man, woman and child in Virginia should be clothed in flannel next the skin; and, therefore, the production of a large supply of *home-made flannel, from home-bred sheep, whose fleece will not shrink*, would be a national blessing.

But the most important information, as regards the art of sheep breeding and raising, consists in the *crossings*, and those which it is *proper* and those which it is *improper* to make. This information will form the subject of a distinct and entire lecture, which I will read to-morrow evening.

In our next we will give the very curious information elicited from Mr. Browne on "Trichology" as a test of insanity, by a commission "de lunatico inquirendo" in Philadelphia, a few weeks since.

COTTON AND SUGAR.

GEORGETOWN, Demerara, May 26, 1851.—The raising of cotton and sugar is receiving more than ordinary succor from our capitalists, and more than a half a million of acres, heretofore sterile, are now carefully and scientifically planted, with a reward in prospect of £500 from the British Government, on the production of the first hundred bales of cotton.

Every effort is now being made by Great Britain to secure such a supply of cotton as will establish the price permanently at a point so low as must be ruinous to the planter; and at the same time every effort is being made on the part of the planter to secure to the country that control of all the machinery for converting this cotton into cloth. The planter prefers to employ English laborers, who can scarcely obtain food and have nothing to spare for clothing, when he might have American ones, who would be customers for his great staple to the extent of ten, twelve, or fifteen pounds per head. Under these circumstances, it is somewhat important for him to understand what is the tendency of things in that great market—the workshop of the world—to which he insists on confining himself, in order that Great Britain may fix the price of all she desires to buy, while fixing the price of all she sells, thus leaving to the planter no control over the price of what he either buys or sells; and that he may have that understanding, we invite his attention to the following explanation of the dull and declining state of trade in England, as furnished by the London *Morning Herald*:—

With regard to the depression at Manchester, the uncertain state of the market for the raw material is said to be the cause; but the *Morning Herald* states that *the real cause is notoriously the enormous falling off in the demand for home consumption*, and this fact is carefully concealed by that portion of the press which is under the influence of the free-traders of the manufacturing districts. These writers, as well as the commercial circulars, says the *Herald*, "endeavor to bolster up hopes for the future by stating that the stocks on hand are exceedingly low in the warehouses, as if every person possessing common sense is not aware that the fall in prices will not affect in a corresponding degree all the goods lying on consignment in foreign markets, fabricated at a much higher cost of production."—*Correspondence of North American.*

If evidence be desired of the truth of this view of the case, it will be found in the fact, that the poor-rates of England and Wales, which, in 1840, '41, and '42, were equal to about 1,470,000 quarters of wheat, were, in 1848–9, equal to two millions and a half quarters.* If further evidence be desired of the declining condition of the population of the United Kingdom, it may be found in the fact, that all that can fly to other lands do fly, leaving the blind and the halt, the infirm and the aged, to be supported at home. In the three years above mentioned, the average emigration was 112,000, whereas in 1848–9 it reached 275,000, and in 1850 it was still greater. What will be the amount this year, it is difficult now to imagine; but if it should continue to the close as it has begun, it must leave the population at a *much lower point* than that at which it stood on the first of January last. The arrivals at New-York of Irish immigrants for the first five months of 1850, were 47,185; while those of 1851 have been 67,651, being an increase of a little less than fifty per cent.

Nevertheless, it is upon this country of diminishing population and diminishing productive power that the planter insists upon making himself dependent for a market for his cotton. How much longer will they need to learn,

* Blackwood's Magazine, March, 1851.

that by bringing the loom to the cotton-field, and thus diminishing the number of *middlemen*, they will cheapen cotton cloth, and double the consumption of cotton? That lesson learned, how much longer will be required to learn that the spindle and the loom can never be effectually established in the cotton fields until they shall take to themselves protection in their efforts to bring the loom and the anvil to the side of the plough and the harrow?

THE POLICY OF DEMOCRATIC PRESIDENTS.

In a memoir of himself, written by Mr. Jefferson, in 1821, he gives the following account of the fate of a treaty with Portugal, which he and Mr. Adams had made in London in the year 1786:—

> While in London, we entered into negotiations with the Chevalier Pinto, Ambassador of Portugal, at that place. The only article of difficulty between us was a stipulation that our breadstuffs should be received in Portugal, in the form of flour as well as of grain. He approved of it himself, but observed that several nobles, of great influence at their court, were the owners of wind-mills in the neighborhood of Lisbon, which depended much for their profits on manufacturing our wheat, and that this stipulation would endanger the whole treaty. We signed it, however, and its fate was what he had candidly portended.

Mr. Jefferson was anxious to secure the profit resulting from *manufacturing the wheat*. He knew that a barrel of flour was the equivalent of nearly five bushels of wheat, and that it contained not only that, but also the food and clothing of the man by whose labor it was converted into flour. He was as fully persuaded as was Adam Smith that "a piece of fine cloth contained in it not only the price of the wool, but also of several thousand pounds weight of corn, the maintenance of the working people" by whom the wool had been converted into cloth, and that though neither the corn nor the wool could bear the expense of transportation to distant markets, the two when compressed together into the piece of cloth might "easily be sent to the remotest corners of the world." It was reserved for our times to make the discovery that "agriculture is our chief employment," and that having a "large surplus of agricultural products," it is therefore necessary to pursue that course of policy which shall more and more increase that "surplus" by forcing our population into agriculture, and more and more diminish our power to combine our food and our wool in the form of cloth, so as to facilitate its transmission to distant countries, there to be exchanged for sugar, tea, coffee, and other raw products of the earth for which our soil and climate are less fitted than for the production of corn or cotton.

In a volume recently published in France,* we find a letter from Mr. Jefferson, dated March, 1815, from which we make the following extract, proving that up to that time he still continued firm in the belief that "the manufacturer should take his place by the side of the agriculturist":—

> We have become manufacturers to an extent that would be scarcely credited by those who have not witnessed it, above all if we consider the little time that has been required to make us so, thanks to the suicidal policy of the English. *The prohibition which we have imposed upon articles of foreign manufacture, and the patriotic resolution of our citizens to use nothing coming from abroad where we could produce it ourselves, without regard to cost, guarantees us for ever from the return of foreign influence;* and this should be borne in mind by you in deciding to come and establish yourself amongst us.

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* Œuvres Diverses de M. J. B. Say. Paris, 1848.

Your filature of cotton, on a scale not too extended, combined with the work of cultivation, would be preferable to either separately, and the one or the other might become the principal object according as experience might teach you. Cotton twist is in great demand, and cotton cloth is still more so.

Mr. JEFFERSON saw and fully appreciated the advantage of making a market on the land for the products of the land, and he desired to bring the loom and the anvil into close connection with the plough and the harrow. Such, too, were the views of Mr. MADISON, when, in 1829, he wrote his letter to Judge Cabell, in which he gave his opinion in favor not only of the constitutionality but of the expediency of the policy of protection—*that policy which seeks to obtain perfect freedom of trade by annihilating the monopoly of machinery which it has been the object of the British system to establish.* Such, too, were the views of General JACKSON when he wrote to Dr. Coleman that

Heaven smiled upon and gave us liberty and independence. That same Providence has blessed us with the means of national defense. * * * He has filled our mountains and our plains with minerals—with lead, iron and copper—and given climate and soil for the growth of hemp and wool. These being the grand materials of our national defense, they ought to have extended to them *adequate and fair protection*, that our own *manufactories and laborers may be placed on a fair competition with those of Europe.* * * * In short, sir, we have been too long subject to the British merchants. It is time that we should become a little Americanized, &c. &c.

In 1815 Mr. Jefferson believed that we were guaranteed for ever from the return of foreign influences. In 1824 General Jackson saw that we had been "too long subject to the British merchants." What would these great men have said had they lived to see the day when Liverpool was illuminated because of the passage of a law which looked to breaking down the manufacture of both cloth and iron, and rendering the whole body of farmers and planters more subject than they had almost ever been to "the British merchants?" It is time that both planters and farmers should open their eyes to the fact that *they it is that must pay the cost of transportation*, and that precisely as the market is brought near to them they grow rich, and precisely as it recedes from them they grow poor. The tariff of 1846 was passed by aid of "foreign influence," and by that influence it is now maintained, and maintained it will continue to be until we can, in the words of Jackson, *become more Americanized.*

PEAT-CHARCOAL.—(To the Editor of the *Sussex Agricultural Express.*)—Sir:—Having heard of the power of charcoal in deodorizing night-soil or any fœtid matter, I was induced to obtain a small quantity from the Irish Amelioration Society's stores, in East Smithfield. On trial, I find that its powers have not been exaggerated; for, by mixing about equal quantities of charcoal and soil, the latter is completely deodorized, and changed to a comparatively dry powder. The cost of the charcoal in Lewes is about £4 per ton, and as this will prepare a ton of night-soil, (which is generally to be had for fetching away,) a manure equal to guano may be had at a cost of £2 per ton and a little labor. In a sanitary point of view, its benefits are greater; for, by covering the surface of the soil in a cesspool occasionally, all smell is prevented from rising, and the formation of noxious *gases* (so detrimental to health) will be avoided. The benefits which Ireland will receive by the employment of her pauperized peasantry in the manufacture of peat-charcoal, will be immense, and may, under the Divine blessing, lead to a better state of things than now exists in that most unfortunate country.—I am, sir, your obedient servant, PETER FULLER, *Malling Mill, Nov.* 19, 1850.

A NATIONAL CONGRESS OF AGRICULTURE.

We are happy to learn that there is a reasonable prospect of forming a Congress of Agriculture, to be composed of delegates duly appointed by the several State and County Societies, which exist in different parts of the Union. It is the object of this national organization to increase and extend the usefulness of all the associations united in the confederacy, and to promote the formation of similar societies in the States and districts which lack the advantages of these well-tested aids to the improvement both of agriculture and agriculturists.

All must see that the cordial co-operation of the two or three hundred societies now in successful operation in the United States, to advance a common cause, will impart new strength, dignity, and respectability to these valuable associations. As civilized communities are now governed, all great improvements are accomplished by the skilful combination of means and efforts concentrated upon one object. Although there are three millions of farmers in the Union, yet, the professional influence of each being isolated, and all remaining without union or concert of action, they are now no nearer the attainment of a National Board or Bureau of Agriculture than they were when President Washington so earnestly recommended the measure. Indeed, the time will never come when a Congress of politicians will do what ought to be done for the great farming interest of the country, unless this interest is organized in some way to give expression to its views on the subject of agricultural education, by means of schools, colleges, experimental farms, and professional libraries. Agricultural science has nothing whatever to expect from State Legislatures nor from Congress, before its friends form a perfect union among themselves, and act as one man in favor of an increase of facilities for the study of agricultural geology, chemistry, physiology, mechanics, entomology, and all the other important sciences which illustrate the arts of tillage, husbandry, and horticulture. The same principle of associated effort that creates a small agricultural club in a rural district, with a good library of professional books, is capable of extension in this Republic until ten thousand excellent agricultural libraries shall be equally distributed throughout a nation of farmers. Here is a national object worth working for. The State of New-York alone has 10,000 common school libraries; and let State and County Societies unite under a federal constitution, and the creation of a like number of agricultural libraries will be one of the noblest achievements of this new confederacy.

The representative system is well understood by every American; and the National Congress of Agriculture, we understand, will have a delegate from each district that sends a representative or delegate to the United States Congress; and every State Society is to have two delegates, to answer to the two Senators from such States. Where there are several counties and societies in a district, they are expected to unite in choosing a representative to the Congress of Agriculture. They can, if they think proper, appoint the representative from that district in the political Congress their delegate, or any other worthy citizen that may be at the federal metropolis. The Congress of Agriculture, when assembled, is expected to create a board or bureau to collect information from all parts of the United States, and from foreign countries, to be embodied in a journal which is to be distributed among all the members of the confederacy. The collection and distribution of valuable seeds, cuttings, and plants, is to form another feature in the duties of this central bureau. It will also be prepared to make all necessary analyses of mineral and organic

substances which relate to rural affairs. Science and literature must be fostered in connection with agriculture, if we would elevate this calling to the dignity of a learned and honorable profession. Why teach all hopeful young men to look for an eternal scramble for the spoils and honors of office, as the only road to distinction in this country? Politics are degraded by this mercenary system; and the public good demands that the material and educational interests of the owners of the soil be no longer made the foot-ball of partisan politicians. Farmers can do for themselves all that they need, independently of politicians, if they will only unite for mutual instruction and general improvement. Suppose that a million of the most patriotic contribute each a dollar a year more than they now do for professional knowledge, would it greatly impoverish them? And yet a million of dollars, wisely expended, would do more for the promotion of American agriculture than Congress will do in a century. It is not money nor legislation that is wanting, but a thorough and universal organization. This, and this alone, can give us *the science of agricultural improvement.*

So long as we neglect the principle of associated effort, and despise the matchless advantages of scientific combinations, the larger the numbers in the community, the greater must be our weakness, and the longer our discreditable dependence on others who do combine for every thing of a public nature. Unless the friends of agricultural science and education are willing to see the citizens of this Republic remain fifty years behind those of Europe, in agricultural colleges, schools, and experimental farms, they must concentrate the force of all existing societies into one body, where it will tell with commanding effect. This body being representative and national in its character and objects, may properly be called "The United States Congress of Agriculture." The Central Congress of Agriculture in France has six hundred delegates from the numerous local societies of that Republic; and it is found to work admirably as a common head and bond of union to the whole. It has promoted the organization of other societies in districts where improvements were sadly neglected, and its all-pervading and salutary influence is felt every where, stimulating experiments, research, and the careful saving of all fertilizers. There can be no question of the usefulness of a similar Congress in the United States, where agriculture extends over a vastly wider field.

IRON FENCE.

We have been shown a model of an iron fence, just patented by Mr. John B. Wickersham, which, for durability and the ease with which it is put together, is far superior to any we have ever seen. By a simple arrangement of a screw at every 300 feet, it can be easily tightened, thus overcoming what has always been the difficulty with wire fences, the great tendency to sway down. Mr. Wickersham's address is, 240 Broadway, New-York. We clip the following notice from the *Public Ledger*:—

Improved Iron Farm Fence.—Mr. John B. Wickersham, formerly of this city, but now extensively engaged in the manufacture of iron railing, &c., in New-York, has recently patented an improved farm fence, which has many advantages over his original invention, and being much simplified, is greatly reduced in price. The improvement consists in the mode of securing the rails or wires at the posts. Instead of the eyes used in the original invention, through which bolts were passed to bind or strengthen the fence, it is now made in sectional parts, with slots in the post, so arranged that when in place they break

joint with each other. This slot in one section extends upward, and in the other downward, and each rail is furnished with a loop or dead-eye turned in each end, which prevents it from passing through the slots. Double-acting screws are introduced every 300 feet, with which to tighten the fence. The posts are also of an improved form, so as to secure their being fixed permanently in the ground. The iron clamps at the foot of each post are so turned as to present a flat surface of resistance to the earth. The fence thus constructed is warranted to possess an unusual degree of elasticity and strength, and their economy and durability must commend them for general adoption. The cost is but $1.50 per rod, for the materials of a fence 4½ feet high, with five rails; and the planting of it is so simple that it can be accomplished by the ordinary hands about a farm. The price is about equal to that of a cedar post and rail fence in this neighborhood, while in the western prairies, where timber is scarce and expensive, this iron fence will probably prove the most economical by at least 25 per cent. Paint will of course be requisite to prevent rusting, but a single coat will last for years.

HINTS IN REGARD TO THE PRESERVATION OF PURITY OF BREEDS, AND THE IMPROVEMENT OF STOCK.

While a lad I resided in the same town with an old physician, who then gave the greater part of his attention to the rearing of mules for the West-India market; and there was a fact brought to the notice of all who observed closely, that seems to have a very important bearing upon the retention of purity of blood, and the improvement in the breeds of animals. *It was observed that after a mare had borne a mule, she never would bring forth a colt of any value, because it would possess so much the appearance of a mule as to render it unsaleable.* Suspecting this rule might apply as well to other animals, I observed that a spotted cow of the native breed produced her first calf, whose sire was a deep red, of a similar color to the male parent, and for five or six subsequent years, although she was covered by a spotted, brindle, and a dark-brown bull, yet her calves were all of a deep red.

I made many similar observations at the time, yet, as they were not placed upon record, I do not purpose to refer to them except as it relates to sheep. I lived in a wool-growing region, and we farmers' sons prided ourselves upon wearing home-spun "sheep's gray" for pantaloons; and to be able to keep in the fashion it was necessary to have at least one black sheep in the flock. If one of the ewes brought us a black lamb for her firstling, we felt quite sure she would continue to do so the remainder of her life; and if we already possessed as many of those wearers of sable coats as we wished, the unfortunate amalgamationist was inevitably consigned to the tender mercies of the butcher.

Lest it may be thought that what I have considered as spots upon the sun are only specks on my glasses, I will present the corroborating evidence of several English observers. Dr. Harvey, physician to the Aberdeen Royal Institute, says: "A young chestnut mare, seven-eighths Arabian, belonging to the Earl of Morton, was covered in 1815 by a quagga, which is a species of wild ass from Africa, and marked somewhat after the manner of a zebra. The mare was covered but once by the quagga, and after a pregnancy of eleven months and four days gave birth to a hybrid, which had distinct marks of the quagga in the shape of its head, black bars on the legs, shoulders, &c. In 1817, '18, and '21, the same mare (which had in the mean time passed into the possession of Sir Gore Ouseley) was covered by a very fine black Arabian horse, and produced successively three foals that bore unequivocal marks of the quagga." Besides the instance already quoted, there is another similar case recorded: "A mare, belonging also to Sir Gore Ouseley, was covered by a zebra, and gave birth to a striped hybrid. The year following she was covered by a thorough-bred horse, and the next succeeding year by another horse. Both the foals thus produced were striped; that is, partook of the characteristics of the zebra."

In both these instances the mare had produced offspring from males of a different species from themselves. Walker, Baker, and Haller state that they have made similar observations to my own in regard to the ass and mare.

Mr. McGillivray gives two instances of similar results where mares had only been covered by males of their own species, although of a different breed. In the royal stud, at Hampton Court, several mares had bred from the horse Colonel, and the next year, although the foals had been got by the horse Actæon, in several of them there were ob-

served unequivocal marks of the horse Colonel, which had been with the mares the previous year.

The Earl of Suffield had a colt got by the horse Laurel, that so closely resembled another horse Camel, that among the dealers it was boldly asserted that the colt must have been obtained from Camel, until it was ascertained that the dam of the colt had previously borne a colt from Camel.

Similar facts are frequently observed among breeders of cattle; so many, that Mr. McGillivray, after narrating many, says: "Among cattle and horses they are of every-day occurrence."

The Rev. Charles M'Combie, of Aberdeenshire, tells of a neighbor of his who had been twice married, and had issue by both husbands, five by the first, and three by the second. Of the last three, one, a girl, bears great resemblance to the first husband, who differed very much in features, complexion, and general appearance from the second. Professor Simpson, of Edinburgh, tells of a Scottish woman who had borne a mulatto child from a negro man, and afterward a girl, whose father was white, had many of the characteristics of the negro race.

Physiologists, while they have admitted the phenomena, have been divided in their modes of explaining the laws that govern them; some supposing that an impression was made upon the imagination of the mother, producing a permanent result, while others deny the possibility of such a cause. The more probable reason to me is this: The offspring and the mother are so intimately connected by the funis, (navel-string,) that the same blood circulates through the veins of each, and thus the progeny of the first impregnations produces a change in the whole organism of the mother, assimilating it in a degree to the male parent. If this be the true explanation, thus do husband and wife become, literally, "bone of one bone, and flesh of one flesh;" and in this manner we can account for the failure of many persons in their endeavor to obtain animals of a perfectly pure breed. Let them look to it that the female has not had her blood tainted by breeding with animals of a different class, previous to her being coupled with those whose peculiar characteristics they wish to perpetuate. C. H. CLEAVELAND.

Waterbury, Vt., March 12th, 1851.

For more extended and curious information on the subject of cross-breeding, we would refer such of our readers as desire it to a work recently written by Dr. Alexander Harvey, of the Aberdeen University, published by W. Blackwood & Sons, of Edinburgh.—*American Agriculturist.*

OUT-DOOR OCCUPATIONS OF ENGLISH WOMEN.

WE have always thought the *physical education* of our women too much neglected, and had intended to address to our fair readers some remarks upon this head, when the following from Downing's *Horticulturist* came very opportunely to hand:—

The young English woman is less conspicuously accomplishsd than our young women of the same position in America. There is, perhaps, a little less of the *je ne sais quoi*, [I don't know what,] that nameless grace which captivates at first sight, than with us, but a better and more solid education, more disciplined minds, and above all, more common sense. In the whole art of conversation, including all the topics of the day, with so much of politics as makes a woman really a companion for an intelligent man in his serious thoughts, in history, language, and practical knowledge of the duties of social and domestic life, the English women have, I imagine, few superiors. But what, perhaps, would strike one of our young women most in English society, would be the thorough cultivation and refinement that exists here, along with the absence of all false delicacy.

The fondness of English women (even in the highest rank) for out-of-door life, horses, dogs, fine cattle, animals of all kinds—for their grounds, and, in short, every thing that belongs to their homes, their real, unaffected knowledge of and pleasure in these things, and the unreserved way in which they talk about them, would startle some of my young friends at home, who are educated in the fashionable boarding-school of Madame —— to consider all such things "vulgar" and "unlady-like." I accompanied the younger members of the family here this morning in an exploration of the mysteries of the place. No sooner did we make our appearance out of doors than we were saluted by dogs of all degrees, and each had the honor of an interview and personal reception, which seemed to be productive of pleasure on both sides. Then some of the horses were brought out of

the stable, and a parley took place between them and their fair mistresses; some favorite cows were to be petted and looked after, and their good points were descanted on with knowledge and discrimination; and there was the *basse cour*, [poultry-yard, we suppose Mr. D. here means, the word having several different significations,] with its various population, all discussed and shown with such lively unaffected interest, that I soon saw my fair companions were "born to love pigs and chickens."

I have said nothing about the garden, because you know that it is especially the lady's province here. An English woman with no taste for gardening, would be as great a marvel as an angel without wings. And now, were these fresh-looking girls, who have so thoroughly entered into these rustic enjoyments, mere country lasses and dairy maids? By no means. They will converse with you in three or four languages; are thoroughly well grounded in modern literature; sketch from nature with the ease of professional artists, and will sit down to the piano forte and give you an old ballad, or the finest German or Italian music, as your taste may dictate. And yet many of my young countrywomen of their age, whose education—wholly intended for the drawing-room—is far below what I have described, would have half fainted with terror, and half blushed with false delicacy, twenty times in the course of the morning, with the discussions of the farm-yard, meadow, and stables, which properly belong to a wholesome country life, and are not in the slightest degree at variance with real delicacy and refinement. I very well know that there are many sensibly educated young women at home, who have the same breadth of cultivation, and the same variety of resources, that make the English women such truly agreeable companions; but, alas! I also know that there are many whose beau ideal is bounded by a circle that contains the latest fashionable dance for the feet, the latest fashionable novel for the head, and the latest fashionable fancy work for the fingers.

PREPARATION OF FLAX COTTON.

THE excitement on the subject of flax manufacture is such as to induce us to republish the following extract from the proceedings of the Royal Flax Society in England, though we have no faith in the substitution of flax for cotton to any material extent:—

Dr. RYAN commenced his address to the meeting by stating that since the subject of the Chevalier's invention had been brought before the Council, he had been down to Bradford, for the purpose of witnessing, on a large scale, the practical operation of M. Claussen's plan, and he should now have much pleasure in detailing the results of his observations. Dr. Ryan begged also to remark that he was not there for the purpose of finding fault with any of the existing processes for preparing flax fibre, but merely, as the Chevalier's chemical advocate, to point out to the Society the advantages of what he might be allowed to term a most beautiful discovery. Before, however, he proceeded further, he would take the liberty of answering at once an objection made by Mr. Beale Browne, that it would be impossible to mix flax cotton, or fibre, with common cotton, because of the difference in the specific gravity of the two; that flax would make cotton goods heavier. This was Mr. Browne's objection; but Dr. Ryan could inform him that, although flax fibre, in its usual state, was specifically heavier than cotton, yet, when prepared by Chevalier Claussen's plan, it became exactly of the same gravity as American cotton. He then proceeded to detail the operations at the works of Messrs. Quitzow and Co., at Apperley-bridge, near Bradford, Yorkshire. He described the process of preparing the straw for scutching as one which only occupied four hours, instead of five days—the shortest period under even the patent of the late Mr. Schenck, the one now patronized by the Royal Flax Society of Ireland. The materials employed by M. Claussen were merely soda and sulphuric acid, and these in such a form and in such quantities as not to injure the most delicate fabric. Thus the proportion of soda was only one part in 200 parts of water. The acid was added after the straw had been boiled with the soda; and the objections to the employment of such a substance would be overcome by remarking that the proportion of the acid was only one to 500 of water, and that the soda present in the straw neutralizes the whole of the acid, and forms a neutral salt—sulphate of soda. Dr. Ryan then proceeded to state that means had been adopted to ascertain the strength of fibre thus prepared, in comparison with that prepared by Schenck's process, and the result was highly satisfactory. In the next place Dr. Ryan explained the process of cottonizing the flax, or in other words, of splitting its fibre, and converting it into a material which could scarcely be distinguished from the finest American cotton. This he considered the most beautiful and useful portion of the

discovery, opening, as it did, a new market to the flax-grower, and enabling the manufacturer to spin it on any machinery hitherto employed for cotton, silk, or wool. Dr. Ryan then detailed the process itself, pointing out the elastic force of the carbonic acid gas liberated in the tubes of the flax fibre by the action of an acid on the carbonate of soda, or of potash. He also stated that he came prepared to show to the meeting, practically, by experiment, the processes of splitting and of bleaching—experiments which would render the matter intelligible to every one present.

At this moment Dr. Ryan handed to Professor Way, the consulting chemist to the Society, a copy of Chevalier Claussen's specification; and it may be stated that in a few moments the Professor returned to the council-room, and remarked that he had just himself tried the experiments according to the directions of the inventor, and had perfectly succeeded in splitting and bleaching some flax fibre. It was therefore suggested to the Chairman by Dr. Ryan, that as Professor Way was a perfectly disinterested party, it would be better for him to operate before the meeting. This Professor Way did most successfully, bleaching and splitting a quantity of flax in the course of about two minutes.

Although we have long been practically familiar with the expansive effects of aëriform fluids suddenly disengaged chemically from an apparently solid and inert substance like gunpowder, either in fire-arms or the blasting of rocks, and with their elastic recoil when released from the pressure of condensation, as in the air-gun or the liquid gases of Dr. Faraday, we were not prepared for so beautiful an instance of the application of this principle as the one Chevalier Claussen has given us in the splitting of vegetable fibre, by conveying into its interstices the carbonic acid gas concealed in condensation and chemical alliance with soda, and then setting it free by the addition of acid, which breaks off that alliance by its own superior elective affinity for the alkali. Means shown in their result to be so powerful, and in their operation so gentle yet decisive, gave to the simple experiment made in the presence of the Council by Professor Way, more the air of a new instance of natural magic than the sober reality of an ordinary operation of natural laws, of which the application only was novel; and its effect on the meeting was accordingly both singular and striking, occasioning evident marks of their agreeable surprise and admiration at the result obtained. The flax fibre soaked in the solution of sub-carbonate of soda was no sooner immersed in the vessel containing the acidulated water than its character became at once changed, from that of a damp rigid aggregation of flax to a light expansive mass of cottony texture, increasing in size like leavening dough, or an expanding sponge. The change was no less striking, when this converted mass in its turn was placed in the next vessel which contained the hypochlorite of magnesia, and became at once bleached, attaining then the color, as it had just before received the texture, of cotton.

"Let us now," said Mr. Jefferson to Mr. Austin, "place the manufacturer by the side of the agriculturist." Well might he say it, for while there is no State in the Union where the plough could be made to yield more than in Virginia, on account of superiority of soil and climate, there is none which has suffered more, for want of the manufacturer being placed by the side of the agriculturist; nor one, we may add, where materials and water-power for the use of the manufacturer are more convenient and abundant.

For the manufacture of cloth and iron she has wheat, corn, wool, iron ore and coal, or the means of producing them, without limit. We have before stated that, with all her societies for agricultural improvement, abounding over the State, thirty years ago, and with all the admitted intelligence of her landholders, the produce per acre of the Valley of Virginia has fallen probably at least ten per cent., in the last twenty years.

Thirty years ago, the late W. Steenbergen's crop from ten hands was 12,750 bushels of grain, averaging not less than fifty bushels of corn to the acre, and twenty-five of wheat and rye. Here we see each hand making 1275 bushels of grain to each hand, of which he and his team of two horses consumed probably not more than two hundred bushels, leaving 1075 bushels for each hand to *find a market* somewhere. Now, does not this over-production of the great machine show the necessity of having the small machines clustered close about the plough and the harrow?

NEW AND VALUABLE DISCOVERY IN LAND DRAINING.

We extract the following from a late English journal:—

We cannot commence our labors in a manner more advantageous to the public, and more satisfactory to ourselves, than by laying before our readers some results of a new discovery in this neighborhood, which it appears to us is calculated to secure most important and immediate benefits to all connected with the cultivation of the soil. We allude to Mr. Cotgreave's (of Eccleston) new practice of draining, in which three vitally important considerations are comprehended, viz.: economy of outlay, economy of time, and increased employment of labor, with its judicious and profitable distribution.

Mr. Cotgreave's principle consists of a series of ploughs derived from the carpenter's plane; in fact, it is nothing more nor less than a land-plane; and when seen, every one must wonder why the principle now brought into operation has not been applied years ago. With the exception of the main drains, all the work, even to the obtaining the perfect level of the drain, is performed by the plough-plane. Mr. Cotgreave has so adapted his plough that with four horses he can throw out a drain from four to five feet deep. The saving of time is another material object. The work by this process is almost incredibly expeditious, and very little damage is done to the surface; indeed, in grass lands a heavy roller will repair all damages. *The cost of workmanship is half the price of manual labor on the present system, and the time occupied one tenth;* while the work, to say the very least, is as efficiently and durably performed.

In the neighborhood where the plough has been used, much has been said of the probability of the implement throwing many men out of employ. This we contend is erroneous, because the want of such an economical implement has hitherto prevented draining to any great extent being carried on. As the agricultural markets now are, the farmer too frequently says, with truth, "Such a field is so wet and poor, I cannot work it." Consequently that land is thrown out of cultivation; and, as land is abandoned to take its chance, so the assistance of laborers is dispensed with. Poverty and poor-rates increase; and crime inevitably follows in the wake. But if the expense of draining is brought within compass, then, as a matter of course, more land will be drained, more laborers permanently employed, and the agriculturist will have a chance of so increasing his produce, that he may earn a livelihood, and, by extra exertion, something more.

The working of the plough-plane is a problem many may doubt: we did so; but we saw, and were convinced of its powers and efficiency.

All who have witnessed the operation of Mr. Cotgreave's draining plough are unanimous in their approbation of the plan, and their conviction of its full and complete success.

We are desirous of calling the attention of the land-owners and holders to the actual merits of this most clever adaptation of the plane; deeming that merit of every kind imperatively commands the attention of the public press most particularly.

Mr. Cotgreave has, most fortunately, that kind of education which is well adapted to his occupation, viz., that of land-valuer and surveyor. His experience as a land-valuer has been called into operation by the Tithe Commutation Act to a great extent; and for the performance of the duties thereto annexed, he must, of necessity, have considerable knowledge of the nature of soils generally. Added to this, he has a large clay farm in cultivation, in his own hands, the treatment of which needs no more reference from us, save that those who wish to know how he works it can see, if they will visit his farm.

We now proceed to the detail of the plough. We find that the necessary staff of men is ten, and of horses four; and with this at command Mr. Cotgreave will be enabled, without distressing either horses or men, to commence two statute acres in the morning, and finally complete, that is, cut the drains, (including the main drain,) lay the pipes, fill in and make good the surface of one statute acre, and half prepare the second to be ready for work the next day. The plough, as we have already explained, is on the plane principle, and, by means of screws, can be adapted as occasion requires, even while in operation in the cutting, to take a shaving of two, three, four, five, or six inches in depth. This control of the plough is most necessary, as it must be evident that certain portions of the land requiring to be drained frequently have undulations; and if there were no regulating principle, it is quite certain no water level could be obtained by a plough. This point we particularly impress on the attention of our readers, because every practical man at first would inquire how this difficulty is to be overcome.

Again—How is the plough to work when a stone obstructs it? This has been considered by Mr. Cotgreave and provided for. If the stone is too large to pass along the plane, or too deep to be turned up by the cutting-in operation, the coulter of the plough is so formed as to protect the share, and with a lever and hooked instrument the stone is

removed ere the plough returns, when the *debris* of the obstruction, in addition to the shaving (if we may so call it) then in process of casting out, are removed at one and the same time.

One of its great recommendations is that it is adapted to every variety and condition of soil, and that it can be worked almost independently of the weather, unless the frost is very intense. In fact, those who have witnessed the plough at work are at a loss which most to admire—the absence of complexity in the contrivance, or the rapidity and perfect success of the operation.

For the purpose of expedition and efficient workmanship, the land-owner ought, before commencing with the plough, to have the pipes of both mains and tributary drains *in the field.*

Mr. Cotgreave's system is to commence with spades, and complete the whole of the main drains before he begins with his plough. He then casts out, with his plough, the clod, measuring six inches square, on the left side of the intended drain, over the compass of two statute acres. This is of great advantage where there is much surface water, as the process of draining immediately commences and renders the land less liable to damage by the treading of the horses; and the main drain being cut, the water percolates to it, and so passes off. He then returns to the first acre, and with the same plough casts out on the right-hand side the sub-soil. To attain the depth of eighteen inches by six inches wide, he requires four drafts—viz, the first six inches, the remaining three four inches each. The plough is then changed for one which will cast out its shaving two inches wide by six inches deep. With this he attains a level bottom. Then commences the pipe-laying. To insure the level, a gauge is passed along the bottom of the drain. This effects the double object of clearing any fallen soil out, and forming a perfect bed for the pipes. As the drain is too narrow to admit of a man getting into it, a new process of laying the pipes is adopted—viz., threading them on a half-inch iron bar, the one end trailing in the drain and the other end in a man's hand. The rapidity and perfectness with which the pipes are thus laid is surprising. A man then follows with a sort of paddle, with which he completely adjusts the pipes, and if there are any spaces by breakage, or otherwise, he repairs the damage. The drain is then ready for filling up, which process again is rapidly executed, and the first clod, in almost *one entire piece* the whole length of the drain, is rolled on to its bed.

We think we have said enough to excite a reasonable curiosity in all to witness the operatron of this valuable implement, and a natural desire on the part of agriculturists to profit by a process so easy in its application, so effectual in its results, and the benefits of which can be appropriated at *half the cost, and one-tenth less time,* than the prevailing practice.

THE BENEFIT OF MAKING A MARKET ON THE LAND FOR THE PRODUCTS OF THE LAND.

The strawberry trade of New-Jersey is much greater than would be supposed. It is said that on one night of last week one hundred and thirty-two wagons full of the fruit passed over the Hoboken ferry, principally from the vicinity of Hackensack, Paterson, New-Durham, and Bergen. One gardener near Bergen is said to have cleared $1500 this season. A large profit is reported to be derived also from the manufacture of baskets in which the fruit is conveyed to market, although they are sold at the low rate of one cent each.—*Philadelphia North American.*

Why has not every part of the country its trade in strawberries and in those other products of the earth that from their delicacy or their bulk will not bear carriage? Because the farmers and planters are almost every where determined that the market shall not be brought to their doors, and equally determined to close those markets which were created under the benign influence of the tariff of 1842. With the growth of mills and furnaces throughout the country, there would be made by them a market for fresh milk, and veal, and strawberries, and apples, and the thousands of other things that could not be sent to distant markets, and with the growth of that market there would be a corresponding growth in the value of land; and then the farmers would grow rich, and they would cease to be compelled to fly to distant lands, the cost of transportation from which absorbs nearly the

whole value of the product. But recently we were told of the enormous richness of the lands of Ohio, and yet the farmers of that State have already reduced the average crop of wheat to less than twelve bushels to the acre, the consequence of which is given in the following paragraph, which we take from an exchange paper:—

EMIGRATION TO MICHIGAN.—The disposition to move West is hard to repress even among the Buck-eyes, and thousands are annually leaving Ohio for newer homes at various points all along to the Pacific.

Every man that goes out from Ohio tends to diminish the value of all the land of that State, and every man that comes into it tends to increase that value. *Population makes the food come from the rich soils, and makes the land-owner and laborer rich.* Depopulation forces men back to the poor soils, and impoverishes both the laborer and the land-owner.

BRITISH IRON AND VIRGINIA RAILROADS.

TEMPTED by the quiet air of the place, and by the unexceptionable "cuisine" of our friend Newton, of the Mansion House, we now and then make our escape from Uncle Sam's tread-mill in Washington, and enjoy a day in Alexandria. A few days since our attention was attracted to the enormous piles of iron rails accumulated there, for the use of the Orange and Manasses Gap railroads, and upon inquiry we ascertained that the rails were not only of British manufacture, but that they had been brought over in British vessels. While we rejoiced at such palpable evidence of the advance of internal improvement in the Old Dominion, we could not but regret the blindness of a people, who, possessing in boundless profusion all the elements of which these very rails are composed, continue in a state of self-imposed vassalage to the British monopolist. We have every reason, however, to hope; the Old State is waking up; her internal improvement policy shows that she has one eye open; when she opens the other, she will make her own iron. On this subject the following admirable article from the Washington *Republic* we substitute for one of our own concoction:—

IMPORTATIONS.—"We are happy to have it in our power to announce that the British barques Avon and Mary, with eight hundred and fifty tons of the iron rails for this road, [the Manasses Gap,] are now on the way from Wales, and may be expected here by the last of July. These cargoes will be followed monthly by others, to the extent of 3,250 tons in all."

The above is from the *Alexandria Gazette*, and is one of those little items which speak volumes. The iron which has been brought by the *British* barques will probably pass over, or be laid upon or near, the very materials of which and by which it was formed, namely: iron ore, limestone, and coal. But the *labor* of gathering these together, and of making the iron, the breadstuffs, clothing, houses, &c., &c., of the laborers employed in manufacturing the iron, the merchants who purchase, store, and ship it, and the ship which brings it from England to this country, are all British, and must be paid for by American gold. How much better would it be for Virginia, if, instead of sending to England for her railroad iron, she were to encourage the manufacture of it within her own borders. In that case, instead of her coal, limestone, and ore lying worthless in her own mountains, they would be turned into mines more valuable than her gold mines; her farmers, besides finding a market for these materials which now possess no value, would find employment for their negroes, mules, horses, and wagons, in digging them from the earth and hauling them to furnaces. They would also be furnished with a market at their own doors, not only for their flour, corn, cornmeal, oats, rye, &c., but for their potatoes, cabbages, beets, carrots, peas, beans, chickens, turkeys, geese, eggs, butter, cheese, milk, beef, pork horses, and mules—in short, for every thing they could raise on their farms or dig out of them; every thing which laboring men and their families need to make them comfortable.

The demand for the products of the farm would at once stimulate the industry of the farmer, and he would cultivate two hundred acres where he now cultivates but one hundred; and in a very short time raise four times as much from each acre as he now does. Then the commissions of the merchants, the storage, wharfage, and freight of the iron would be saved; or, at any rate, whatever transportation was necessary to take the iron to the place where it was to be used, would be done by our own people and our teams, which must be fed and supported by the products of our own farms; and thus all the money employed would pass from hand to hand among ourselves, and each one who contributed labor in any shape, whether in the form of manual labor, horse or mule labor, flour, corn, beef, pork, &c.—for all these things are the products of labor—would receive his due proportion.

Instead of this, however, Virginia thinks it the best policy to buy every thing, and let her own resources go to waste, her own farms grow up with pines and scrub oaks, and the whole face of her country to wear the appearance of shiftlessness, indolence, and decay. We must make some exceptions, however, for here and there her farmers are beginning to wake up and introduce improved cultivation, in imitation of their neighbors in Maryland and Delaware, and of some who have gone in among them.

So long, however, as this country pursues the policy of buying that which we can just as well produce, of employing foreign labor instead of our own, so long shall we fail to reach that state of general prosperity, thrift, and enterprise of which we are abundantly capable.

But we are told that the country is now enjoying an unprecedented degree of prosperity, and the very large receipts of customs are pointed to as an evidence of it. We have noted these large receipts, and we have observed too the constant stream of gold that is passing from the United States to England and France, to enrich those countries, whose labor is thus draining us, while ours is left uncared for, and our laborers are often driven out of employment by foreign competition, and compelled to seek a livelihood by ways and means to which they are wholly unaccustomed, and in which whatever of skill and experience they have acquired are of no avail.

We have observed, too, that notwithstanding the constant stream of gold that is flowing from this country to Europe, we are accumulating an enormous foreign debt for articles of convenience and luxury, most of which we could just as well manufacture at home, and thus keep our money to enrich our own farmers, mechanics, and artisans. If our country is prosperous in spite of this constant drain of its gold and silver, what would be its prosperity if that drain were cut off, and the currents which now flow from the United States and fertilize all Europe were turned back upon our own soil, and made to fill the pockets of our own citizens!

We have no very accurate means of ascertaining the amount of indebtedness which stands upon the books of Europe against us, but we suppose it to be not less, and it may be considerably more, than three hundred millions of dollars! At least we have heard it estimated at that by those whose interests sharpen their attention to these matters. Now, if this is not an over-estimate, we are paying an annual tribute to Europe, in the shape of interest, of not less than from $1,500,000 to $1,800,000, and this is constantly on the increase.

A similar state of things existed in 1836–'7–'8, except that we had then no California mines to supply the means to pay for our enormous importations, and the consequence was a general bankruptcy and break-down, as it must always be to those who buy more than their earnings will pay for, unless they have an exhaustless treasury to draw upon.

The following paragraph, from an article in the London *Times*, virtually tells us that we are but colonies of Great Britain, and in a state of semi-dependence upon them; and there is, we fear, too much truth in the rather taunting remark, that we take their manufactures and surplus population, and give them in return "*the materials of industry*, of revenue, and of life." We are quite ready to take their population, if it is not sent to us from their poor-houses; but while laborers are pouring into the country, it seems to be a strange policy to send abroad those materials which it could find profitable employment in working up into such fabrics as we need, and now import at such an immense cost. We see not why the profits of converting these materials into manufactures might not as well go into our pockets as those of the "cotton lords" of England:—

"It is no empty compliment, but a literal truth, that this flourishing condition of the United States revenue *is as great a blessing to us as an equal excess in our own revenue. For all practical purposes the United States are far more closely united with this kingdom than any one of our colonies;* and while these communities are colonies in name, but in reality either prison, garrison, or independent communities, the United States keeps up a perpetual interchange of the most important good offices; *taking our manufactures*, and our surplus population, and giving us in return the materials of industry, of revenue, and of life."

STATEMENT OF L. G. MORRIS'S SECOND ANNUAL SALE, ON 24th JUNE, 1851.

Some remarks which were to be furnished, introductory to the following list, having failed to reach us, we are obliged at the last moment to send it to press "without note or comment." We presume something will be furnished on the subject for the next number.—Printer.

THOROUGH-BRED SHORT-HORN COWS, HEIFERS, AND HEIFER CALVES.

Lot			
	1.	York, General Cadwalader, Philadelphia,	$110 00
	2.	Cleopatra, 9 years, do. do.	85 00
	*4.	Coquette, 4 years, Edward H. Smith, Smithtown,	50 00
	5.	Red Lady, 4 years, General Cadwalader, Philadelphia,	175 00
	6.	Eleanora, 4 years, do. do. do.	135 00
	8.	Miss Rolfe, 2 years, A. Van Ingen, jr.,	105 00
	9.	Fame, 16 months, General Cadwalader, Philadelphia,	60 00
	*10.	Red Rose, 15 months, G. Hopkins, Long Island,	30 00
	11.	Kate, 5 months, G. G. Hubbard, West Needham, Mass.,	140 00
	12.	Lily, 3¼ months, Joel Terrill, Oswego,	80 00
	13.	Beulah, 2½, General Cadwalader, Philadelphia,	55 00
	14.	Pocahontas, 11 years, Henry Parsons, Canada West,	100 00

IMPROVED DAIRY STOCK.—COWS, HEIFERS, AND HEIFER CALVES.

15.	Beauty, 6 years, Dr. A. Smith, New-Rochelle,	$105 00
16.	Sue, 8 years, Richard Lewis, New-York,	100 00
17.	Watson, Henry Parsons, Canada West,	80 00
18.	Strawberry, General Cadwalader, Philadelphia,	75 00
19.	Bess, 6 years, G. Hopkins, Long-Island,	65 00
20.	Gazelle, 4 years, G. W. Thacher, Pelham,	105 00
21.	Alarm, 3 years, John Rae, Morrisania,	37 50
22.	Lady Independence, 3 years, Robert Legoin, Richmond Co.,	67 50
23.	Miss Stewart, 2 years, James Robertson, Peekskill,	70 00
24.	Harlem Maid, 2 years, General Cadwalader, Philadelphia,	75 00
25.	Lady Canning, 2 years, G. G. Wilmerding, Suffolk Co., L. I.,	120 00
26.	Marietta, 2 years, General Cadwalader, Philadelphia,	70 00
27.	Sabina, 2 years, Dr. Smith, New-Rochelle,	77 50
28.	Miss Mary, 19 months, Robert Legoin, Richmond Co.,	75 00
29.	Bessie, J. J. Mapes, New-Jersey,	35 00
30.	Clara, 14 months, Robert Legoin, Richmond Co.,	30 00
31.	Laura, 10 months, General Cadwalader, Philadelphia,	30 00
32.	Lucy, General Cadwalader, Philadelphia,	37 50
33.	Helen, 3¾ months, Morris Ketchum, New-York,	100 00

SHORT-HORN AND AYRSHIRE CROSS.

34.	Countess, 4 years, General Cadwalader, Philadelphia,	82 50
35.	Irannie, 2 years, Morris Ketchum, New-York,	90 00
36.	Betty Merryman, 9 months, P. R. Paulding, Tarrytown,	60 00

NEARLY THOROUGH-BRED DUTCH.

37.	Julia Edgar, Lewis Livingston, Rhinebeck, Dutchess Co.,	120 00
38.	Dinah, do. do. do.	37 50

OXEN.

39.	1 yoke of oxen, S. T. Wright,	145 00

BULLS AND BULL CALVES.—THOROUGH-BRED SHORT-HORN.

Lot			
	1.	Logan, 23 months, Oliver Slate, jr., Throg's Neck,	$175 00
	4.	Mark Anthony, 4 months, J. B. Wilson, Wisconsin,	135 00
	5.	Passaic, 2 months, Joel Terrill, Oswego,	50 00

SLIGHTLY CROSSED WITH AMSTERDAM DUTCH.

6.	Pontiac, 16 months, J. G. Godwin, Kingsbridge,	70 00
7.	Red Rover, 4¾ months, T. C. Rives, Virginia,	105 00
8.	Medley, 11 months, Edward Biddle, Rockaway, N. J.,	65 00

PURE BRED DEVON.

10.	Barton, 16 months, General Cadwalader, Philadelphia,	145 00

BUCK LAMBS.

Lot 1.	Buck Lamb, 3 months,	Aaron Clements, Philadelphia,	$30 00
2.	Do. do. 2¾ months,	Edward G. Fail, West Farms,	30 00
3.	Do. do. 3¾ months,	Lincoln Brooks, Providence, R. I.,	30 00
4.	Do. do. 3¼ months,	General Cadwalader, Philadelphia,	30 00
5.	Do. do. 2 months,	do. do. do.	25 00

SWINE.

Lot 1.	One pair of Pigs,	Henry Parsons, Canada West,	$37 50
2.	Do.	do. General Cadwalader, Philadelphia,	30 00
3.	Do.	do. Churchwell,	30 00
4 and 5.	Two pair	do. G. G. Hubbard, West Needham, Mass.,	50 00
6.	One pair	do. Captain Spencer,	20 00
7.	Do.	do. Thomas Hancock, Burlington, N. J.,	20 00
8.	Do.	do. Henry Parsons, Canada West,	30 00
9.	Do.	do. Aaron Clement, Philadelphia,	27 50
10.	Single Boar Pig,	Lewis Livingston, Rhinebeck, Dutchess Co.,	17 00
11.	Do.	do. General Cadwalader, Philadelphia,	17 00
12.	Do.	do. J. B. Wilson, Wisconsin,	17 00
13.	Do.	do. Thomas Hancock, Burlington, N. J.,	16 00
14.	Do.	do. Lincoln Brooks, Providence, R. I.,	16 00

All the above Pigs were dropped from the 7th to the 10th of April last.

Lot 16.	One Sow in pig, 9 months old,	G. G. Hubbard, Mass.,	30 00

GREAT SALE OF PURE BRED DURHAM SHORT-HORNED CATTLE.

THE annual sale of improved Durham short-horned cattle, offered by that veteran breeder of fine stock, George Vail, Esq., of Oak Grove, near Troy, N. Y., came off June 26th. The lot offered consisted of thirty-one animals, nearly all of which showed the fine points and qualities of the high-bred Durham, and whose pedigrees were given with great care on the catalogues; besides which, two others were sold at private sale, after that accomplished auctioneer, Col. J. M. Miller of New-York, had sold those on the list, making in all thirty-three head, which sold for the sum of $4,170, an average of over $126 each. Eight or nine of those on the list were calves, dropped during the past spring, one of which, a heifer calf, four months old, sold for $165.

The cattle were generally in fine condition, and reflected much credit on their owner. The cows showed evidence of deep milking properties. A number of the best of the herd had been bred by Mr. Vail from his splendid imported Bulls, Duke of Wellington and Meteor, from the stock of the late Mr. Bates of Kirkleavington, England, who stood among the very first in the rank of the great breeders of short-horns.

The company in attendance was very large, and was composed of gentlemen of New-York, as also from many of the other States, and from Canada. Some very fine animals were purchased by gentlemen from the latter named place.

The arrangements for the sale were all in the best taste; the bidding spirited and liberal.

Previous to the sale, the large party were handsomely entertained by Mr. Vail with a capital collation, got up in his usual good style on such occasions.

The distribution of so many fine animals through the country must prove highly beneficial to the community; and the friendly meeting of farmers and others from different sections of the country, with their interchange of opinions in matters of rural improvements, will be recollected with pleasure and profit.

HOW TO MAKE THE RICH RICHER AND THE POOR POORER.

ANOTHER PRESSURE FROM THE SCREW.—We announced lately the failure of a number of furnaces in Clarion and Venango counties. We also noticed the stoppage of work at several of the rolling mills in this city. We also published the report of the Board of Revenue Commissioners in relation to Alleghany county, showing the depreciation of property, and particularly in that of iron and cotton, which was officially reported at fifty per cent. of its value. We have now before us another instance of ruinous depreciation of iron property on our waters—that of the Monongahela Iron Works on Cheat river, a short distance from where that fine stream empties into the Monongahela between Brownsville and Morgantown. In 1842 this property was purchased by an enterprising firm in Baltimore—the Ellicotts—for $80,000. Since that time they have improved the property by the building of two additional furnaces, which cost together $32,000, and expended in other valuable improvements in all $60,000.

It consists of 15,000 acres of land, one fifth of which is fine farming land, a large portion of which is under good cultivation—one large rolling-mill and nail factory—three large blast furnaces, costing in all $42,000—grist-mill, saw-mill, and about 70 dwelling-houses, many of them large and valuable buildings. There is also on the place a ferry of note, which in times of prosperity and trade was of itself worth $300 rental—and a land throughout abounding in iron ore and stone coal in exhaustless quantities, and, excepting the cleared farms, covered with heavy timber. This extensive property was brought to the hammer on Monday last, at Morgantown, Virginia, and, with all its improvements, sold by the Sheriff for $25,750.

An event of this kind presents matter for serious reflection. It is an evidence, in the first place, of the total want of value attached to iron property—the price realized being actually less than the value in ordinary times of good trade and good markets of the land. In the second place, of the growing scarcity of money which the holders can more profitably employ in buying bonds, bills and mortgages, than investing it in iron or landed property. The first is produced by the fall of iron, consequent upon the encouragement of foreign importations under our present tariff. The second is by the exportation of the precious metals to pay for the imports thus made, not only of iron, but a vast number of articles admitted at equally low rates.

In this view of the case we would ask, Who is benefited by the course of policy productive of such results? Is it the laboring man, the farmer, the mechanic, the printer, the doctor, the preacher, the coal digger, or the boatman? Do any of these find their profit in this state of things? Under a system of protective duties such as we had under the tariff of 1842, who are they that were injured? Was it the laborer, who found under it constant employment and good wages? Was it the farmer or mechanic, who found under it fair and full prices for the product of his farm and his factory, with abundance of good money in circulation? Was it the printer, the doctor, or the schoolmaster, who found his employers and customers with sufficient and ready means to pay? Was it the preacher, who saw his congregation joyous, happy, prosperous and devout from the abundance and blessings around them? If these things are so, why is this curse of a demoniacal course brought upon us to oppress and destroy us? Let the question be asked of the dominant Locofoco party in Congress.—*Pittsburg American.*

Who is it that benefits by the course of policy that leads to such results? Not the nation certainly, for we consume less iron than we did four years since, notwithstanding the enormous growth of population. Not the farmer, for his customers for food are being daily converted into rivals—producers of food instead of consumers of food. Not the planter, for the discharged workman consumes less cotton. Not the manufacturer of cotton, for he finds a daily diminishing demand for the products of his looms. Not the merchant,

for he is in daily apprehension of the crisis that must come when he shall cease to be able to negotiate loans. Not the ship-owner, for the import of men, which trebled under the tariff of 1828, and trebled again under that of 1842, would now be retrograding were it not that British free trade is rapidly destroying the agriculture of the United Kingdom, and expelling the poor people of Ireland, of Scotland, and of England. Who then is it that profits by what is called free trade? Scarcely even the speculator and the gambler, for their profit is but temporary, as may be ascertained by an inquiry into the fate of the men who have built the palaces of New-York and Philadelphia. The shrewd capitalist bides his time, and as *free trade* works out the ruin of the honest and industrious man of small means, he buys their property, and thus it is that the present commercial policy of the country—called democratic—tends to make the rich richer and the poor poorer.

THE RESOURCES OF VIRGINIA.

THE *Richmond Republican* is calling attention to the resources of Virginia. Lead is found there in abundance, and also plumbago in several places east of the Blue Ridge. Besides the immense salt regions of Kanawha, there are in southwestern Virginia inexhaustible stores of this valuable mineral. The salt water found in Washington county is stronger than that of any other county. Fossil salt, the largest, if not the only deposit of the kind discovered in the United States, is found near the salt hills above noticed, and has been bored into at least fifty or one hundred feet, and without going through it. Gypsum, or plaster of Paris, of the purest kind, exists in great abundance in connection with the fossil salt. There are many deposits of iron ore, from which refined and hammered iron can be made, which will rival the best productions of Russia and Sweden.

Of all the States of the Union, Virginia is the one that should advance most rapidly, and that would do so, were it not for her determination to pursue a policy that tends to exhaust her soil and thus compel her people to waste their capital, in accordance with the policy that Great Britain has forced upon all her colonies, and that she now, under the specious name of free trade, is endeavoring to force upon all the independent nations of the earth. It is impossible to look upon the map of the Union without being struck with the vast advantages possessed by Virginia, in regard to intercourse between the several parts of her own territory, and between her territory and that of the Western, Northwestern and Southwestern States. Her rivers furnish large portions of the State with means of intercourse with the great markets of the Union, while the depressions of the Alleghany ridge within her limits point to her territory as the natural line of communication between the valley of the Mississippi and the ocean. She abounds in coal and in iron ore, in lead and in salt. Her water powers are immense. Nature has done every thing for her, but man has done nothing but exhaust the soil furnished to him by nature, and then fly to other regions to be again in like manner exhausted; and the consequence of her refusal to make a market on the land for the products of the land is seen in the fact that she is steadily declining in consideration, as is shown by the following table of representation in Congress under the several censuses:—

	Virginia.	Penn.	New-York.	Mass.	Ohio.
1790, - -	19	13	10	14	—
1800, - -	22	18	17	17	1
1810, - -	23	23	27	20	6
1820, - -	22	26	34	13	14
1830, - -	21	28	40	12	19
1840, - -	15	24	34	10	21
1850, - -	13	25	33	11	21

How long will it be before the people of Virginia will come to see that wealth and power go always together, and that in her declining power is to be seen the surest evidence of her declining wealth, the consequence of her own suicidal policy?

RESOURCES OF MARYLAND.

We mentioned last week the discovery of lead and plumbago, in the coal region near Frostburg. We have since seen specimens of the same minerals from a different portion of the county, near Oldtown.—*Exchange paper.*

Scarcely a day elapses that does not bring with it intelligence of new mineral discoveries, all tending to prove the ability of the country to supply itself with every thing needed for the rapid improvement of the condition of its people, and for its own advance in wealth and power; and yet, of what advantage is it? The policy of the country is adverse to the development of its resources. It refuses to make a market on the land for the products of the land. It imports coal while possessing it in quantity compared with which that possessed by Great Britain scarcely deserves to be mentioned. It imports iron and lead and copper, while possessing the means of supplying them at a lower rate than elsewhere in the world, provided only that its farmers can be taught to see that every ton of *our own* coal that is mined, every ton of *our own* iron ore and every pig of *our own* lead that is smelted, furnishes a market for *our own* raw products of the earth to the whole extent of its value, and in doing so gives a value to both labor and land; while every ton of coal, iron, or lead, that is imported produces a necessity for sending from the land its raw produce, the refuse of which is to be consumed abroad, to the depreciation of both labor and land.

A VENERABLE ORANGE TREE.

A journal giving some account of the horticultural exposition in Paris, publishes the following biography of the most venerable plant in France, an orange tree at the palace of Versailles, known formerly under the denomination of the Grand Constable:—

"Leonore de Castille, wife of Charles III., King of Navarre, having eat a *bigarade*, a sour and bitter kind of diminutive orange, which no one certainly, in these days, would wish to put to his lips, found it so good (there is no disputing tastes) that she planted in a pot, in 1421, the five pips which this fruit contained. As the orange tree was not then common in Navarre, and as, moreover, the hand by which these seeds had been confided to the earth was not that of an ordinary gardener, the five young trees became the object of particular care. They were not separated, but were cultivated at Pampeluna, then the capital of the kingdom of Navarre, until 1499.

"At that epoch Catherine, sister of Gaston de Foix, and wife of John III., King of Navarre, sent as a present to Ann of Brittany, wife of the King of France, Louis XII., a box containing five orange trees, as a rare and precious object, at the same time indicating their origin.

"That box, with its trees, afterwards became the property of the Constable de Bourbon, who conveyed it to his château of Chantelle, in Bourbonnais, the château from which he marched into Italy in 1523 to take up arms against France. In consequence of this treason his estate was confiscated, and the duchies of Bourbonnais and Chatelleraut, which formed the appanage of the Constable, were re-united in 1531 to the crown of France. At that time Francis I. caused this orange tree to be taken from Chantelle to adorn his manor at Fontainebleau, and in the inventory of the confiscated property of the Constable figures, in a particular article, *an orange tree with five branches, brought from Pampeluna.* This tree was catalogued at Fontainebleau under the name of the Grand Constable.

"When Louis XIV. purchased Versailles, and planted the magnificent orangery which is still so much admired, he collected the finest trees from the other royal residences. The Grand Constable was brought here in 1684, and they added to this name that of the great Bourbon, a designation which it has continued to bear to the present day. But another remarkable fact is, that in 1684 the Grand Constable was confided to the care of a gardener named Lemoine, and from that year it was cultured by Lemoines, who succeeded from father to son, until 1833, when the last of the name, having no male child, retired from the post. This last Lemoine died at Versailles in 1846. Here, then, is a tree 430 years old, which, during 150 years of its existence, has been tended by the same family."

MANUFACTURE OF COTTON.

HERE is an article from the *New-Orleans Crescent*, which we wish every capitalist and cotton planter in the South to read and think of:—

ADVANTAGE OF COTTON MANUFACTORIES.—When cotton is ten cents a pound, the charges attending its transportation to Liverpool amount to over four cents a pound. The cotton which comes back to us in the manufactured fabrics pays, first, the charges of export, a profit to the manufacturer, and all the charges attending the return. New-Orleans exports 1,000,000, which, at ten cents, would amount to $45,000,000. The cost of transportion will more than cover all the expense of converting the raw article into yarns and the various kinds of cloth. So that if the English would spin and weave for nothing, it would be a better business for us to manufacture it at home, and pay our own people for their work. This million, worth now only $45,000,000, if converted into yarns and coarse cottons, will be worth $150,000,000. If it is asked how this wealth is to be retained, the answer is obvious. Divert a part of the slave labor from the field to the factory. Diminish the quantity of the raw material, and increase that of the manufactured. This will keep up the prices of both. The banks of the Mississippi are the true places for cotton mills. The supply of fuel is inexhaustible. Coal floats down to the factory by the cheapest channel in the world. Corn, flour, meat, all the comforts of life. The slaves will form the most efficient and the cheapest operatives. Thus, instead of paying away millions on the cost of freight, millions for the labor of foreign artisans and the use of foreign capital, we can save all this. If England can afford to buy our cotton, carry it across the Atlantic, manufacture it, and then reship it to this country, can we not afford to make it at home? Why should there not be a factory upon every bluff on the Mississippi?

The present system of employing slave labor in agriculture exclusively is suicidal. The factory has no overflow to fear, no late nor early frost, no drought, no caterpillar. Its crop is safe, subject to no contingencies—no casualties. It is controlled by man, independent of the elements. As an investment for security, for certainty of results, and uniformity of income, it has no superior. One of the evils to which other manufacturing establishments are subject, does not exist here. There can be no secessionists in the southern factory. A "strike" is a moral impossibility. And yet with all these advantages in favor of the labor from departments suffering from over employment, none of the Louisiana slave-owners have the energy and boldness to engage in this new and most profitable employment.

SULPHURED RAGS *v.* HARES.—I have frequently experienced the efficacy of the plan of keeping hares, &c., from barking trees, by means of rags dipped in brimstone. Persons subjected to this annoyance will not regret trying the brimstone; the experience of the last few days induces me to recommend the trial.—*S.*

NEW BOOKS.

Rena; or the Snow Bird. By CAROLINE LEE HERTZ, author of "Aunt Patty's Scrap Bag," "Linda," &c. &c. Philadelphia: A. Hart, late Carey & Hart.

At the present day, when we are so flooded with all kinds of trash, with catch-penny names and immoral tendency, it is refreshiug to get hold of a book like *Rena*. Written in Mrs. Hertz's beautiful style, it is a book of more than common interest; and we heartily recommend it.

LECTURES ON BOTANY.*

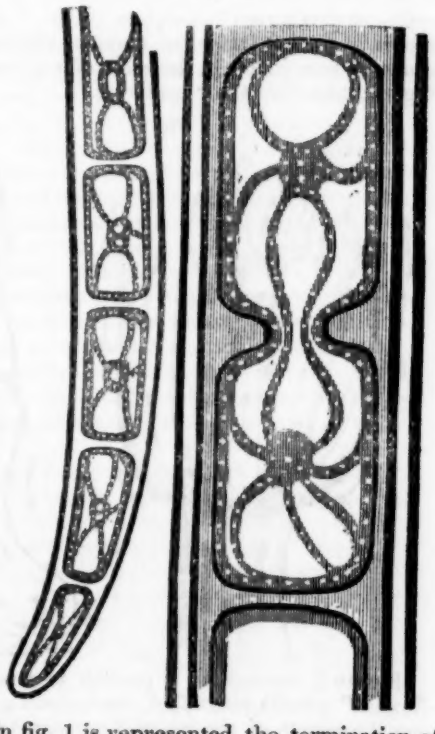
COURSE OF LECTURES ON BOTANY IN REFERENCE TO AGRICULTURE.

By CHARLES JOHNSON, Esq., *Professor of Botany at Guy's Hospital, &c. &c. At Messrs. Nesbits' Agricultural and Scientific Training School, Kennington Lane, Lambeth, near London.*

LECTURE III.

THE operations by which vegetable life and development or growth are maintained, however plausibly set forth by physiologists, and perhaps correctly so in the aggregate, are still, in our present state of knowledge, for the most part incapable of positive demonstration. Their combined effects are seen in the enlargement of parts previously formed and the production of new ones. The leaf opens from the bud, attains its destined size, changes its hue, and falls; the fruit ripens and discharges its seed; the seed grows into a plant, and the same processes are renewed from year to year; but the organs that minister to them are so minute, their mutual action so complicated, that although the external and grosser machinery of life is sufficiently evident, the springs that work it are involved in mystery. The microscope is too limited in its application to effect much toward the elucidation of the phenomena of life. The child breaks his toy to find out the source of the music which his act annihilates; and in like manner the philosopher tears up the organic tissue, or at best deranges its functions, that he may apply his glasses in the vain effort to detect the origin of that which is no longer there; still something is gained by both. The child has perhaps discovered a string that produces a sound when struck, and a little wheel with spokes that might have struck it; while the philosopher has discerned a few facts of which he was previously ignorant; and, in the end, each of them "garring odds and evens meet," and "laying that and that th'gither," find themselves a degree wiser than before. The important fact of the circulation of the blood was discovered and established by a similar series of deductions; and although its passage from the arteries into the veins would be, perhaps, vainly sought by inspection of the minute extremities of those of the higher animals, in the translucent tail of a stickle-back, or the membraneous foot of the frog, the diverging and returning currents are beautifully and obviously displayed. So in plants, although the movements of the sap and other juices cannot be traced in the woody tubes of the higher and more elaborately constructed orders, yet the microscope discovers in the cells of the minute and delicate hairs that grow from their surface, and in those of the leaves and stems of certain aquatic vegetables, comparatively very low in the scale of being, fluids in constant motion, which, with their accompanying phenomena, throw much light upon the process of increase in the tissue to which they belong.

Fig. 1.



In fig. 1 is represented the termination of one of the slender, hair-like aquatic plants, called "confervæ;" which consists of little transparent cells, more or less elongated, and joined end to end like a string of beads. In each of these cells the microscope discovers currents of fluid, containing minute particles, moving in the direction of the dotted lines, and apparently circulating from one extremity of the cell to the other, and returning on the opposite side. In the center, or sometimes toward one of the ends of the cell, is a small cluster of particles, from and toward which currents pass in a radiating manner, rendering the combined movements very complicated. The little central mass, however, evidently greatly influences the rotation of the

* Continued from page 59.

fluid, and the result is a gradual thickening of the membrane composing the wall of the cell, and likewise an eventual separation of the mass itself, either laterally or longitudinally, into two, each becoming a separate center of motion. The currents thus disturbed, the inner coat of the cell begins to contract between them, as exhibited in the left-hand figure, dividing it into two cavities, which are afterward more or less extended by the force of their respective currents.

Although no apparent connection exists between the cavities of the contiguous cells, careful and repeated observation shows that the movements of the fluids in each influence those of their neighbors, and that a reciprocal action is maintained throughout the whole living fabric. The uniformity of direction preserved by the currents in different cells is in accordance with this latter circumstance, and is beautifully exemplified in the stems and whorled branchlets of the "characeæ," another tribe of aquatic plants, a grade or two higher in the scale of vegetable organization than the "confervæ."

Fig. 2.

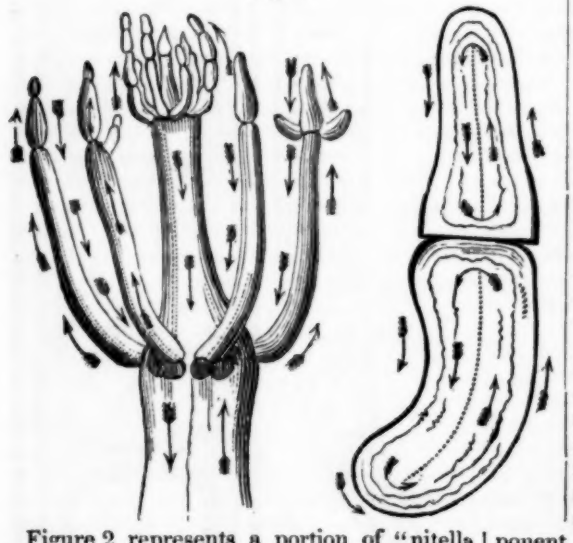


Figure 2 represents a portion of "nitella flexilis," greatly magnified, the arrows marking the course of the internal currents (more distinctly shown in the farther magnified view on the right) of the two terminating cells of one of the branchlets; from inspection of which it will be understood how a complete rotation of the fluid takes place in each cell, passing upward on one side and returning on the other, and that a similarity of movement obtains throughout each whorl of branchlets; the ascending current being toward the outside of the plant, the descending toward the inner or axial side of the whorl. These motions are more or less rapid, according to the season or the temperature under which the examination is made. In the winter time they are scarcely observable.

In what degree the flow of the sap in the higher orders may resemble these curious phenomena, we have not at present the means of ascertaining. The different condition of the woody tubes which contain and conduct it, as compared with that of the cells we have examined, may involve considerable diversity of organic action: and it would be absurd to endeavor to deduce any general conclusions from so very partial an acquaintance with a few isolated facts; the more important and ultimate phenomena of vegetable physiology are yet as much a mystery to human speculation as is the source of life itself.

The relative distribution of the minute elementary organs described in our last Lecture varies in different plants, and, as we shall see hereafter, occasions organic distinctions of high importance to the practical as well as to the merely theoretical student. But under whatever arrangement of the vital channels and recesses the existence and development of the vegetable are maintained, the general process is probably not very dissimilar between the highest and the lowest; the most complicated and the simplest of their structures being rather modified than changed for the required adaptation. The difference between the foodful and the poisonous, in all their degrees of quantity and intensity, are produced by causes which are only secondary or subsidiary to those that regulate the action of the main-springs of vegetable life. In all the higher orders of plants the absorption of nutriment by the root is but a small, however necessary, portion of a complicated process, involving a vast amount of vital and chemical action, whose conjoined effects are witnessed in the production of those secretions that give them character or property and value in the domestic economy of Man. The first elaboration of the absorbed nutriment changes it into *sap*—a fluid possessing nearly the same general characters in all plants, though unquestionably the medium from which their most diversified products are secreted by subsequent modification of its original component principles and (as it would appear in some instances at least) the addition of others. Leaving, however, these latter, and the sources of their derivation, to be discussed at a future period, we will now examine the structure through which the sap is conveyed, and the adaptation of the external organs traversed by its channels to the fulfillment of the changes which it is destined to undergo.

The popular notion respecting the functions of the root are very incorrect, it being generally regarded as the sole medium through which nourishment is conveyed to the plant; while, so far from such being the case, almost every other part presents more or less of an absorbing surface: not, perhaps, in constant or uniform action, but capable of so adapting itself under peculiar circumstances. Some plants, especially those of slow growth and succulent habit, will live

and increase for long and indefinite periods when deprived of root, and apart from the earth in which they naturally vegetate. A socotrine aloe has been suspended in a chamber of my dwelling-house for upward of seven years, and during that time has increased greatly in size, weight, and number of leaves; of which latter organs three or four are developed every year. It is still growing, and as healthy as one of the same kind planted in a pot and kept in a green-house, although its sole source of nutriment must be absorption from the surrounding air through the medium of its leaves. This is no isolated case, but one among many, of a plant growing without roots or perceptible cause of development, simply cited because it has been constantly under my own observation. From it we may understand how possible it is that a vegetable rooted in the soil may still derive much of its subsistence from a different source; nay, that the root may rather even be necessary to secure it a fixed habitat than for its support.

The mode in which the root acts where its assimilating functions are required, and the laws of its development, are circumstances in general little appreciated by those whose daily pursuits are intimately connected with this part of the vegetable economy. The capability of imbibing from the soil seems to be chiefly confined to the extreme ends of the fibres, and hence arises the drooping of plants when they are shifted from one spot to another. How carefully soever the transplantation may be made, the absorbing extremities are broken off in consequence of their adhesion to the soil; or, otherwise, exposure to the dry atmosphere contracts their tender tissue, and renders it for a time, even when replaced in the moist earth, incapable of drawing the necessary supplies.

A section or slice of one of the fibres above alluded to, viewed under the microscope, shows it to consist of a coating of very lax and distended cellular tissue, including a central column of woody tubes and ducts, the outer portion of the tissue having its cells generally much more compressed than those of the interior, somewhat in the manner represented in one of the figures of cellular tissue portrayed in the last Lecture; but the extreme points of the root-fibres never exhibit such contraction of the external vesicles, which appears to take place gradually, as the result of age and the occasional defalcation of moisture in the soil; to compensate for which change the fibres are continually extending in length during the growth of the plant, and thus perpetually present a newly-formed surface of cellular tissue for the absorption of the stimulating and necessary moisture. These extremities are generally thicker than the part of the fibre immediately above them; and, being of a soft, sponge-like texture on the outside, have received the name of "spongioles." It is by not attending to the preservation of the spongioles, or rather from the total ignorance of many practical gardeners and foresters in regard to their existence, that so many trees and shrubs are killed by being transplanted. The spongiole is the growing point as well as the organ of absorption; and, owing to the little care taken in removing the plant, or rather in consequence of the utter carelessness with which it is wrenched from the imperfectly loosened soil, by far the greater number of these little, but important, parts are broken off and left in the ground. Hence probably—nay, we might say certainly—the reason why large trees cannot be successfully transplanted. Growing vigorously, such a tree quickly absorbs all the nutritive matter from the soil in its immediate vicinity, and extends its roots from time to time deeper or more widely distant, to seek the required supply elsewhere, until the growing points of their intricate ramifications are too far removed from the site of its trunk to be preserved during the process of shifting. Obvious, however, as are the absorbent functions of the root, as exemplified by these phenomena, no one who has closely studied the varied structure and physiology of vegetables, and marked the diversified habits and modes of growth that often characterize individuals belonging even to the same natural family, will maintain the popular opinion of its being the universal source of aliment. Among those plants whose vital action cannot be supported without it, even but for a short period, there are various grades in the essentiality of its action as an absorbent organ. This is especially evinced by the different situations in which they vegetate, or are capable of vegetating.

It is not intended by any of the foregoing remarks to deny the important agency of the organ under consideration, but only to direct attention to the fact that such agency may be suspended under peculiar circumstances in certain plants: which, still continuing to live and grow, prove that other organs of assimilation exist, and, existing, are more or less concerned in the maintenance of vegetable life. The most essential of these latter are the leaves, of which only a very small number among the higher orders of plants are destitute; and even these tend by their peculiarity of habit to throw a valuable light on their physiological influence.

In regard to the actual functions of the leaves, opinion has been much divided, but they are now very generally considered to be the lungs or breathing organs of the plant; at the same time it is probable that this function is associated with some others, either uniformly acting or dependent on the influence of external circumstances, as the presence or absence of solar light, the condition or changes of the atmosphere, &c.; and, likewise, that in many instances no inconsiderable proportion of substance is conveyed into the growing plant through their medium.

The anatomical structure of a leaf, and the connection which exists between it and the vessels or veins of the wood and inner surface of the bark, are all calculated to maintain the

important function of respiration—a function upon which seem primarily to depend those modifications of the sap that are essential to the production of the secretions that give so great a diversity of character to different vegetables, and render them available to the various purposes of human economy. Considerable analogy, too, unquestionably exists between the breathing apparatus of plants and animals. In the higher orders of the latter the lungs are almost wholly composed of the ramifications of the bronchial tubes or branchings of the windpipe, and two sets of blood-vessels, called the pulmonary veins and arteries—the ultimate divisions of the three being so minute and intricately blended as almost to baffle the researches of the anatomist, even though assisted by the highest powers of the microscope. The delicate extremities of the air-tubes terminate each in a little rounded cell, over the walls of which branch the almost inconceivably minute extremities of the arteries and veins—the blood circulating in which is thus brought into close contact with the air drawn into the lungs at each inspiration.

It would be foreign to our subject to enter into description or discussion of the physiological phenomena connected with this function in the animal, but it is one apparently essential to all organic beings, however it may be modified in their several grades to accord with their greater or lesser complexity of structure, and their diversified habits and modes of existence. Let us now examine the leaves, and endeavor to ascertain how far the received opinions concerning their respiratory functions are capable of being substantiated by fact.

Viewed apart from the plant on which it grows, the leaf is a very curious and complex structure. A frame of fibre branching from the top of its stalk, or, where the stalk is wanting, from the base of the leaf itself, forming a kind of net-work, the interstices of which are fitted up with a green, soft substance, the whole inclosed within a thin skin or membrane, is all perhaps that the unassisted eye is capable of detecting; but the fibrous frame-work, when magnified, is discovered to consist of the woody and spiral tubes already described, compactly bound together at the lower part, and gradually separating from each other in the form of veins as they extend toward the margins and extremity. The green, pulpy matter occupying the intervals between their ramifications consists of cellular tissue, filled with green particles—its little cells not contiguous throughout, but leaving small open spaces here and there; while the skin-like covering of the leaf *(epidermis)* consists of a layer of small compressed cells, apparently empty or only filled with air, colorless and transparent, so as to admit of the colored veins and green tissue of the interior being visible through them. The skin or *epidermis* varies in texture in the leaves of different plants: as does, likewise, frequently that of the upper and under surfaces of the same leaf. The size and arrangement of the cellules of which it is composed are often very irregular. It possesses considerable rigidity and toughness in some plants, and in all serves to protect the more delicate tissue beneath from external injury. In the greater number of vegetables its continuity is interrupted by pores or openings, technically denominated "stomata," which occur in some cases only on the under surface of the leaf, in others on both sides, and are more or less numerous. Thus, in the leaf of the common lilac, which has none on the upper face, 160,000 have been counted on one square inch of the lower; while in that of the carnation, within the same space, there are 38,500 on each side. The stomates are not mere perforations in the epidermis, but spaces, generally of an oval form, in the middle of which is a slit that opens or closes according to the condition of the atmosphere, or other circumstances affecting the state of the growing plant. The oval border consists, in most instances, of two oblong parallel cells, capable of contracting, so as to become somewhat kidney-shaped, thus opening the stomata; which, so long as they remain straight, are closed.

Fig. 3.

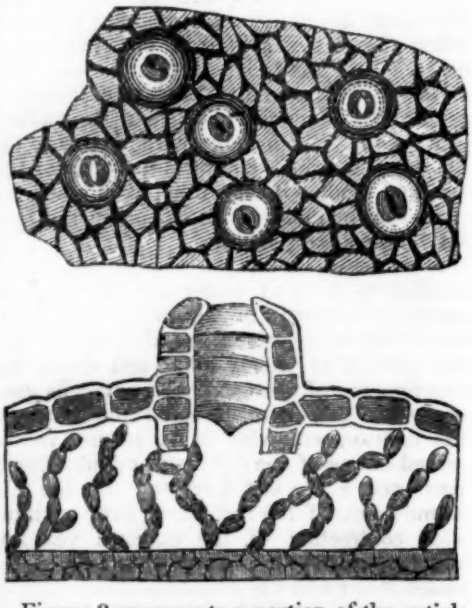
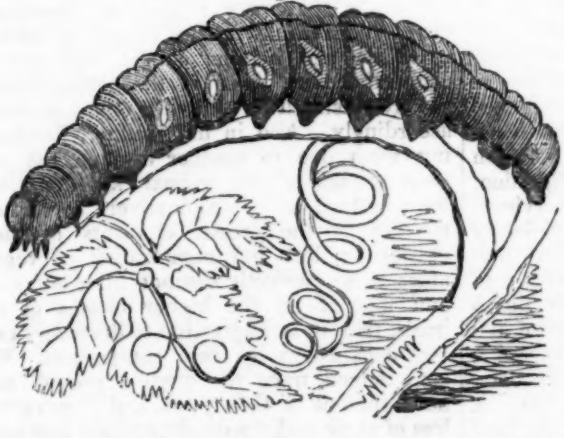


Figure 3 represents a portion of the cuticle of the elk's-horn fern *(acrostichum alcicorne)* highly magnified, with several of its stomata; and at *b* is a vertical section of one of them, showing the vacant spaces into which it opens in the substance of the leaf.

Between these stomates and the spiracles or breathing-pores of some of the lower orders of animals, considerable resemblance unquestionably exists; and numerous experiments (of which our space will not admit any detail) have confirmed the opinions entertained by physiologists concerning their corresponding functions.

It may be difficult for one who has no farther acquaintance with the act of respiration than that derived from his own experience, or from the casual observation of the mode in which it is performed in the few animals of the higher grade with which he is accustomed to associate more or less in the ordinary occupations of his existence, to conceive that such an act can take place otherwise than through the medium of mouth and nostrils; but internal structure is as variable as external form, and involves conditions of life far more diversified than is generally understood. The earth-worm, the spider, the bee and the butterfly are equally dependent upon an alternate inhalation and expiration of the air they move in, as are the man, the quadruped, and the bird; but the process is maintained in a very different manner. The mouth in the former is the vehicle through which food is conveyed into the stomach; but they have no nostrils, and breathing takes place through channels in distant parts of the body. Thus, in the insect, a line of pores is observable on each side of the body, varying in number, but frequently as many as eighteen or twenty, and in certain kinds even many more. They are very evident to the naked eye in many of the larger caterpillars, but in the smaller insects require the assistance of a good magnifying-glass or microscope to discover them. Their position is shown on one of the common cabbage-caterpillars in figure 4. A feather,

Fig. 4.



or a camel's-hair pencil, dipped in oil, and drawn over these two lines of spiracles or pores, kills the insect by suffocation; and if a leaf be rubbed over with oil or varnish, so as to close its stomates, it dies. Hence, indeed, one principal cause why certain plants will not flourish under the shade of trees, while others are not affected by it. In almost all of the latter class that I have examined, the stomates are either wholly wanting on the upper surface of the leaf, or they are comparatively very few in number. Where the stomates are numerous on the upper side, they may become choked by the heavy dripping from the leaves of the tree in wet weather; and, evaporation being checked by its shade, a similar effect is liable to be produced to that arising from the coat of oil or varnish; and I am inclined to believe that this operates as injuriously, or even more so than the obstruction of light, and other causes to which the evil is more generally attributed.

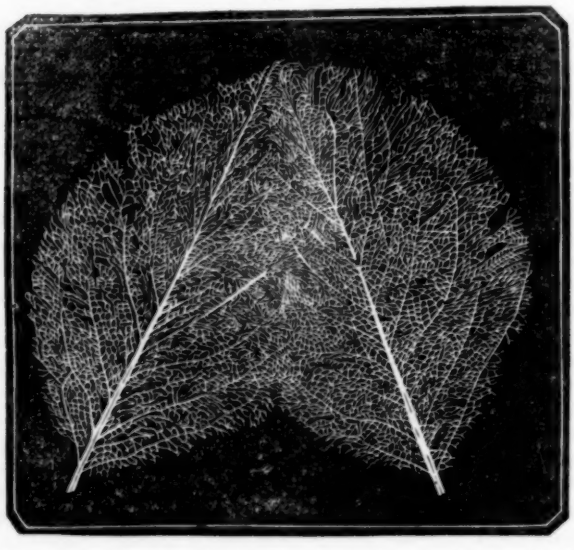
To enable you to appreciate to the desired extent the analogy existing between the respiration of vegetables and animals, a farther examination of the structure of the leaf will be necessary. By maceration, or soaking in water for a few weeks, the decomposition of the softer, cellular portion of the leaf is effected, the skin readily separates, and the pulpy portion occupying the interstices of the veins may be removed by careful washing, leaving the latter entire—they being, in consequence of the greater strength and rigidity of their texture, less liable to decay than the other parts. In this manner the beautiful preparations commonly called the *skeletons* of leaves are obtained; and if the maceration be continued a little longer, the net-work of veins (at first sight apparently simple or consisting of a single series only) divides into two, precisely corresponding with each other, as shown in figure 5. [See next page.]

This curious structure is perhaps more readily ascertainable in the leaf of the common holly than in any other well-known plant, the two sets of veins being less firmly attached than in leaves of thinner substance; but examples of their partial separation may be met with in most damp woods in the spring, among the strata of dead and decaying leaves that then cover the ground. Now, by cutting the stalk of any leaf transversely, and examining the section with a magnifying-glass, you may discern the origin of these veins in two or more masses of fibre; and by carefully cutting through the leaf-stalk, and the stem or branch on which it grows, lengthwise, you may, with the assistance of your glass, trace the connection of one portion of the fibre—namely, that which branches out into the upper net-work of veins—with the woody sheath that encompasses the pith: the other portion, the origin of the lower net-work, passes downward into the "liber," or inner substance of the bark.

This disposition is precisely accordant with the supposed functions of the leaf as an organ of respiration. The sap rises through the woody tubes that surround the pith, forming what is technically called the medullary sheath; and these tubes, branching out into the delicate veins of the upper surface of the leaf, expose it to the action of the air admitted through the medium of the stomates into the internal cavities before described. Whatever may be the nature of this action, which is probably chemical, the properties of the sap are altogether changed by it. From a fluid of comparatively simple character it becomes the depository, in different vegetables, of various proximate principles, of the most com-

plex combinations and energetic qualities; all, indeed, that is hurtful as poison, useful as medicine, valuable in the arts, applicable as food, or otherwise capable of being rendered subservient to human economy, is more or

Fig. 5.



less dependent upon this elaboration of the sap. There are differences of opinion, as previously stated, as to the mode of vital action and the ultimate organization by which these results are effected. Even the theory of vegetable respiration, once considered to be established beyond the possibility of doubt, and supported by numberless experiments apparently the most conclusive, is no longer a settled point in physiology. Some very nice distinctions have been made between the process in question and that of digestion, to which the leaves are likewise subservient; but neither of these operations are sufficiently obvious in the experiments hitherto performed on growing plants to enable us to separate them. By whatever name we designate the source of these modifications of the vegetable juices, and whether we regard it as a simple or a binary process, it is accompanied by a large amount of exhalation. A common sunflower, three feet high, is found to exhale one pound and a quarter of fluid, chiefly water, every day; and the common cabbage nearly as much. This exhalation is ascertained to be chiefly through the medium of the leaves; and, considering their corresponding functions, is analogous to the watery exhalation that accompanies the action of the lungs in animals. That the stomata are concerned in the disposal of this superfluous moisture seems to be very evident, as in succulent plants, and others growing in situations subject to long-continued drouth, these openings are generally very sparingly distributed, while they are most numerous in those that derive large supplies of water from the soil in which they naturally vegetate. Led away by this fact, and contemplating the vast quantity of water exhaled by plants possessing numerous stomata, some physiologists of the present day seem inclined to deny the instrumentality of the latter in the admission of air to the interior substance of the leaf; regarding them only as organs of excretion, like the pores of the animal skin.

The reciprocal action of the spiral vessels is no less a subject of dispute than that of the stomata, and on a similar one-sided view of their structure and situation; although no authenticated instances can be adduced of their containing, at any period after their first development in the tissue of the plant, anything but air; and they are for the most part only traceable in those portions upon which these curiously adapted openings exist—so uncertain is our actual knowledge of the phenomena of vegetable growth, and of the vital functions which they indicate! In fact, there is scarcely any branch of physical science so little understood as that of Vegetable Physiology.

By examining the interior of the human body after death, and comparing the relative situations of its various organs with the functions and sensations of the living, we are enabled to decide with a tolerable degree of certainty upon their real agency in the system; and, on dissecting other animals and finding organs in similar situations and bearing similar relations to each other with those of the human body, we are justified in drawing our inferences accordingly. And in this manner, descending from one to another through the various grades of the animal kingdom, we have arrived at a comparatively correct estimation of the grosser elements of their existence; but the organization of vegetables is so perfectly distinct from our own and that of all the higher classes of animals, that it is impossible to draw any correct conclusions by mere comparison. We can, indeed, trace the gradual growth and development of their parts, and observe the loss of vigor and the debility which precedes decay, and from other concomitant circumstances consider them as exceptions to the inertia of matter; in other words, as being endowed with that hitherto incomprehensible principle, *life*. We can proceed a few steps farther by dissection, and, discovering a system of vessels traversing the plant throughout its whole substance, are led to conclude that life here, as in animals, is dependent upon a continually repeated elaboration and modification of the fluids they contain; nay, the microscope shows us those fluids in motion, and almost in the act of depositing the petty molecules that contribute to the growth of the tissue. There we stop. Comparison fails to assist our researches any farther; and experiment, often founded on the uncertain basis of bare conjecture, is our only guide beyond,

SUPERPHOSPHATE OF LIME.

USE OF SUPERPHOSPHATE OF LIME, PRODUCED WITH ACID AND BONES FOR MANURE.

BY W C. SPOONER.

[Prize Essay of the Royal Agricultural Society.]

THE difficulties under which the pursuit of Agriculture has for some years labored—the importance, and, indeed, the absolute necessity of raising the largest crops of roots at the least possible expense, afford ample reasons for the Council of the Royal Agricultural Society of England proposing as a subject suitable for a prize essay, "The Use of Bones with Acid," which on high authority has been designated "the most important saving which was ever held out in the use of manure." If any additional reason were required why the utmost attention should be devoted to this important matter, and the most extended information gained respecting it, it may be found in the fact that while the constantly increasing population of this country demands a corresponding augmentation of animal and vegetable food, the sources of supply both of bones and guano are likely to become greatly diminished. Thus, not only as it affects the interest of the occupier and owner of the soil, but also on national grounds, is the subject of our essay worthy of the deepest consideration. The superior economy of employing bones mixed with an acid, over that of using bones alone, is no longer a hypothetical or even a probable statement, but an established fact; and though I shall have to offer some results in corroboration, yet I do not hold them as essential to the subject, so fully has the success of the mixture been established from the numerous experiments related in the Journal of the Royal Agricultural Society, and more particularly in the excellent and elaborate essays of Mr. Hannam. And though I shall find it necessary to pass rapidly over all the various branches of the subject, yet my claims for honorary notice will principally rest on affording such practical information on points hitherto but briefly attended to, as may, I hope, render this essay of really practical and pecuniary value to agriculturists in general.

The specific effect of bone as food for the turnip crop has long been known—long, indeed, before science was in a position to explain the cause of its peculiar effects, or to assign correctly to what portion of its constituents the benefits are chiefly due.

It was found, greatly to the surprise of many, that burnt bones, in which of course the organic parts had been destroyed, were equal, if not superior, in their effect to bones not so treated; and that when boiled, in which state the fat had been expelled, they were more productive than bones in a fresh state. It was thence supposed by those who jumped to conclusions too hastily, that the substances thus expelled were useless at any rate for the turnip crop, and they were apparently supported by the theory of a very eminent chemist, who, if we mistake not, laid it down as his opinion that the value of manures depended principally, if not entirely, on their inorganic ingredients—a doctrine altogether at variance with the previous generally received notions, that ammonia was the true fertilizing element, and that its amount afforded the measure of the value of manure. *In medio tutissimus ibis*—the truth, we take it, will be found to lie between the two extremes. We may justly regard the inorganic constituents as being the most important and essential portion of manure, affording to the plant what the skeleton does to the animal, the basis of support; and, as plants can obtain no other supply but through the soil, we may justly regard them as *the* most essential constituents.

The other elements are, to a great extent, supplied through the atmosphere, and even nitrogen and its combinations may thus be furnished. The avenues through which this atmospheric supply is furnished are the leaves of the plant, and their size affords a correct criterion, *cæteris paribus*, of the amount of nutriment derived from the aerial source. Thus beans and other pulse obtain more food from the atmosphere than cereal plants; roots more than the former; and wheat, from the small size of the leaves, less than any. Thus only can we account for the striking fact that if we give a good supply of inorganic elements *only* to the turnip crop, we shall very probably have a plentiful crop, while if these be absent, however rich the manure may otherwise be, the crop will be a failure. Not that we must therefore draw the conclusion that the organic manures are of little or no importance to root crops: they are of value, and particularly to the grain crops which succeed.

The organic matter which composes about one-third the substance of bones is, however, so intimately combined with the earthy portion, and their disunion is accomplished with such difficulty, that the good effects of either

are to a certain extent neutralized, at least so far as the first crop is considered; and we are consequently obliged to supply five or six times as much as the crop actually requires, and to render them available by means of pulverization. It is on this principle that the assistance of sulphuric acid is sought for and obtained: it serves by its chemical affinities to separate the component parts of the bones, and render them more soluble and available as food for plants. In the excellent and accurate experiments of Mr. Hannam, related in a former number of the Journal, it was clearly proved that fresh bones when ground were superior to boiled ones, from which the fat was extracted; and the latter were superior to burnt bones, from which the gelatine was also removed. This result was, however, far more striking when the bones were dissolved in sulphuric acid, a difference of nearly two tons of turnips being observed, while with the bones merely ground a difference of 17 cwt. only was exhibited. From the same experiment we likewise learn that the beneficial effects derived from the earthy part of bones are 4½ times greater than that derived from the organic parts. I refer to the Journal for the particulars of these experiments, and to the previous number for other statements, from which, if we had no other evidence, we should be justified in drawing the conclusion that 20s. laid out in bones and acid will go much farther than 40s. expended in bones alone, so far us the turnip crop is concerned.*

These experiments, however, appear to have been made with the addition of a very considerable quantity of water, so as to apply the manure to the land in a liquid state, which, without denying its superiority, is yet attended with such difficulty, trouble, and inconvenience, that it is vain to expect that farmers generally would incur it. The expense of a proper cart for the application of this manure in a liquid state is very considerable, and sufficient to prevent its general adoption. And, although it was in this form that the public were first made acquainted with its valuable properties, yet its general adoption must be attributed to the additional discovery that it can readily be applied in the state of compost by means of the common drill. Having directed my attention to the preparation and employment of this valuable manure in the form of compost, I am in a position to state that by its means one-half the usual expense in the purchase of bones may be saved.

We cannot, however, do better than take as our text, or rather the heads of our subject, the points to which the attention of competitors are drawn by the Council of the Royal Agricultural Society of England, which are—

1. State of Bones.
2. Proportion of acid in a given weight of bones.
3. Proportion of water, if any, mixed with the acid.
4. Mode of mixing the bones with the acid and of preparing the compost.
5. Effect of various quantities applied in combination or comparison with common bones and other known manures.

1. First, then, the state of the bones—with regard to which I have merely to observe that they should be as fine as possible, but the ordinary state of bone-dust will answer the purpose very well. The dust is decidedly preferable to half-inch bones, for, while the increased weight of the former will compensate for its greater price, the points of contact being greatly increased by subdivision, the bones are more rapidly and more perfectly acted on by the acid, and require, in fact, a less quantity both of that and of water.

We next come to the second and more important point.

2. The proportion of sulphuric or muriatic acid to a given weight of bones.

Sulphuric acid is preferable to muriatic acid for several reasons: it is stronger, cheaper, has greater specific gravity, and contains much less water. On mixing it with water, a much higher temperature is attained, which conduces to the dissolving process, particularly of the organic portion of the bones. In addition to these reasons, we find that in the trials which have been made, muriatic acid has been found somewhat inferior. I have, however, been rather surprised that there should not have been a more decided difference than proved to be the case in Mr. Hannam's experiments; and we can only account for this by bearing in mind that the lowest proportion of muriatic acid employed was one-half, which was perhaps sufficient to affect all the phosphate of lime contained in the bones, whereas, if one-third had been employed, as was tried with the sulphuric acid, the result might not have been so favorable for the muriatic acid. Besides this, probably the muriate of lime formed by the muriatic acid is more fertilizing and soluble than sulphate of lime formed by the sulphuric acid; and, from its great attraction for moisture, particularly advantageous in such a dry season as that of 1844. It is, therefore, by no means improbable that an equal quantity of bones prepared separately with the two acids, and afterward mixed together, might be more productive than bones prepared with either acid alone.

The proportion of sulphuric acid most desirable to employ is a very important point, inasmuch as it has been shown that sulphuric acid alone, or mixed with water, possesses very little fertilizing powers. This, probably, is owing to the circumstance of the soil generally containing a sufficiency of this element,

* May we not expect something like the same result when applied to other plants of large leaves—as Indian corn, and tobacco, and clover? We should be glad to attract to this subject the attention of friend Hollowel, or Mr. Teschemacher. [*Ed. F. Lib.*

and to the fact that phosphoric acid is so extremely essential, particularly in the early stages of the growth of the plant, that it will not prosper without it, whatever we may otherwise employ as manure. A neighboring agriculturist during the last year tried to raise a crop of turnips with a good dressing of salt and soot, which contain no phosphoric acid, though plenty of ammonia and other fertilizing ingredients, but the result was a total failure. In a garden experiment, I may here observe, I found sulphuric acid and water succeed as well as bones in raising turnips, but the soil no doubt contained phosphoric acid, as well as alkalies, on which the acid could act favorably.

Before we authoritatively pronounce on the quantity of acid necessary to be mixed with the bones, it will be better to inquire into the nature and properties of the substances we propose mixing together.

Sulphuric acid, or oil of vitriol, as it is more frequently termed, consists of the union of two parts by weight of sulphur with three of oxygen gas, and its strength depends on its purity and freedom from water, for which it has a remarkable affinity, so much so that if exposed to the air it will quickly absorb water from the atmosphere. Its relative weakness, therefore, is owing to the quantity of water mixed with it. In speaking of sulphuric acid, I must be understood to mean in its concentrated state, possessing a specific gravity of from 18·45 to 18·50. And it should be borne in mind, in purchasing the acid, that 50 lbs. of the above is at least equal to 60 lbs. of the specific gravity of 1·714, and therefore if the weaker acid is used, its quantity must be increased in proportion to the diminution of its strength.

On applying the vitriolized bone to the tongue, we find that it tastes both sour and sweet. The sourness arises probably from the phosphoric acid, and the sweetness from the gelatine sugar, which is formed by the action of the acid on the gelatine, converting a substance very difficult of decomposition into one readily soluble, and which can be easily absorbed by plants. When concentrated acid is mixed with a quarter of its weight of water, the temperature of the mixture is raised to 300°, and boils away at a great rate. The action of this heat on the animal part of the bones renders it of a dark color; but if a small quantity of acid only be employed, the mixture is white, from the carbonate of lime which then predominates. From an average taken from several analyses of bones of man and various animals, the following appears to be tolerably near the mean:

Organic matter, consisting of gelatine, cartilage, and fat	34
Phosphates of lime and magnesia	59
Carbonate of lime	7
Total	100

Or, in rough numbers, the organic matter may be regarded as forming one-third and the earthy portions two-thirds. Of course, if the bones are very fresh, the former will be in larger proportion than one-third; thus Mr. Hannam gives it as 45 per cent. The above, however, may be considered as a fair average in the state usually employed by farmers.

Four bushels of bones, which may be considered to be a fair allowance for an acre, will weigh, in a fine state of bone-dust, about 180 lbs.* This quantity contains 12½ lbs. of carbonate of lime, consisting of carbonic acid 5½ parts, and lime 7 parts, which will require 10 lbs. of sulphuric acid to convert it into sulphate of lime or gypsum. This is the first result of the mixture, and is the cause of the very unpleasant fumes which are given off, and which consist in fact principally of carbonic acid disengaged from the carbonate of lime in consequence of the superior affinity which lime has for sulphuric acid. This result takes place before the acid acts on the phosphates of the bones, and thus it is that when a small quantity of acid has been sprinkled over bone-dust, the good effect has been but moderate, the carbonate of lime alone has been acted on, and the phosphate of lime has remained undecomposed.

The quantity of phosphate of lime existing in the 4 bushels of bones is about 106 lbs., containing 47 lbs. of lime and 59 lbs. of phosphoric acid. If we consider super phosphate of lime to contain a double portion of acid—a fact, however, not quite decided—then 33 lbs. of sulphuric acid will be required, which by uniting with half the lime, or 23½ lbs., forms gypsum, and leaves the other moiety of lime united with a double portion of phosphoric acid in the state of a superphosphate. Thus, 43 lbs. of acid will be required to effect these changes, leaving any additional quantity for other purposes.†

Phosphate of lime is a substance very difficult of solution, and thus in a very dry season the effects of bones are often very slight and imperfect. Superphosphate of lime, on the other hand, is extremely soluble, so much so that the vitriolized bones can be entirely dissolved or suspended in water, and thus applied. This at once explains the cause of the valuable properties of the preparation. The bones in their natural state are extremely indigestible: the acid cooks them—converts them into a species of soup which can readily be eaten and digested by the young turnips. The adamantine fetters with which the various elements composing bones are bound so compactly together, are, by means of this new agent burst asunder—the compact is broken, and each constituent element is left to pursue its own course and to exercise its

* I find that the *average* weight of bone-dust, as it comes from the mill, is 168 lbs. per 4 bushels, although I *have* found it reach the weight stated in the text. [*Aut.*

† I do not mean to say that these are the precise changes which take place, but only an approximation to them. Probably some portion of phosphoric acid may be left in a free state in the prepared mixture.

own natural affinities. The chemical changes which take place between the sulphuric acid and the organic portion of the bones are, no doubt, very complicated. Sugar is one result, and probably sulphate of ammonia is another; but I cannot venture to state what quantity of sulphuric acid may be necessary to effect these changes. If we presume that one-third is the proportion of sulphuric acid employed, then there will remain 17 lbs. to act on the organic portion of the 4 bushels of bones—the remainder having been required by the earthy portion.

We find that manufacturing chemists, in the preparation of phosphorus from bones (now largely required for lucifer matches), first destroy the organic part of the bones by means of fire, and then mix the remainder with half its weight of sulphuric acid. Thus, if we suppose 180 lbs. to be the quantity employed, by burning it will be reduced to 120 lbs., requiring 60 lbs. of acid to form superphosphate, which would be one-third the weight of the bones previous to burning. I suppose, however, that in this case an excess of acid is required to render the process complete, as one-half would otherwise appear to be more than the quantity demanded.

From these and other reasons we may justly consider that the proportion of acid to the bones should never be less than one-third nor more than one-half. The former, I think, is the most economical, but probably the precise quantity most desirable will be 42 per cent. of acid. I may, however, observe that in an experiment during the last season, in which one portion of the land was manured with bones and acid in different proportions, that which had more bones and less acid proved to be a somewhat better crop than where fewer bones and more acid were used; the expense being the same in both instances.

3. The proportion of water to be mixed with the acid will next receive our attention.

When one part by weight of water is mixed with four of acid, the temperature is raised to 300° Fahr. It is, therefore, very desirable that sufficient water should be used to produce this great heat, which facilitates the dissolving process; and the quantity above stated, or, if more convenient, the same measure of water as of acid, which will be rather more than half the weight, will be a very good proportion. More should not be used, as no useful purpose will be accomplished. In an experiment tried last year with different proportions of water, I could not detect any difference in the result. The water should be applied first by means of a watering-pot, so that it may be intimately combined with every portion of the bones. This is an important point, and greatly facilitates the dissolving process, which without it is very likely to be imperfectly accomplished.

Another reason for applying the water first is, that the bones becoming partially saturated, the acid, from its great affinity for it, rushes as it were into the pores of the bones in search of the water, and thus the bones become more rapidly and perfectly mixed with and acted on by the acid. When no water is employed, and the bones are not entirely in the state of fine dust, as they never are unless purposely sifted, the surfaces of the small pieces of bone become acted on by the acid, and a coat forms around them which seals up the interstices of the bones, and prevents the acid from penetrating. I have no doubt this is often the case likewise from careless or imperfect mixture, and the good effects of the manure are thus materially diminished.

4. Mode of mixing the bones with the acid, and of preparing the compost.

It has been recommended that a large heap of ashes or mould should be made with a hole or depression on the top, in which the bones are to be placed, the acid poured over them, and after some time the whole shoveled up and mixed together. Now, if we examine into the effects of this mode of procedure, we shall readily perceive the objection to which it is subject. The ashes, no doubt, contain a considerable portion of carbonate of lime, besides other salts, for which sulphuric acid has a very strong affinity. Thus the bones are robbed of a large proportion of the acid, of which they ought to have exclusive possession. And even if common mould is used, or any other substance which has no particular chemical affinity for the acid, still this mould will mechanically absorb much of the acid, and thus deprive the bones of it.* I hold it, therefore, as a point of much importance that the whole of the acid should be directly applied to the bones, and that no other substance should be allowed to intercept or abstract their mutual affinities.

A very convenient and cheap vessel for manufacturing the mixture is a sugar hogshead, having its hole stopped with plaster of Paris. It is very desirable to avoid if possible any measuring or weighing of the acid, as it is so very dangerous a substance to handle. Many serious accidents occurred to my knowledge during the last year, and it is very difficult to impress farm servants with a sufficient degree of caution, or even to convince them that a liquid which appears so colorless will burn their skin and clothes. In emptying a carboy of acid even into a tub it is difficult to prevent a little slopping about and damaging the clothes of the attendants, as well as the basket, &c., which contains the carboy. To prevent these unpleasant consequences I have adopted the following plan: The carboy is placed on a stage or cask the same hight as the sugar hogshead, into which is put the precise quantity of bone-dust we intend mixing with the carboy of acid. The water is now added with a watering-pot hav

* I have not found that any considerable quantity of the acid passes through the bones into the heap of ashes or earth; and though Mr. Spooner's is the better plan, where his apparatus can be easily procured, I still think that the expedient I mentioned may be found sometimes convenient. [*Ph. Pusey*

ing a rose at the end, so as to disperse it thoroughly, and the carboy of acid is then emptied by means of a siphon. This siphon is formed of a piece of block-tin pipe, which can be bent into any form, about ¾ of an inch in caliber, and 4 feet in length. A brass cock is soldered to the long end of the siphon, on which the rose of a watering-pot may be placed. The siphon is now filled with water, and its long end closed with the cock, and the small end with the hand or finger. The latter is then quickly inserted into the mouth of the carboy, the cock turned on, and the acid will continue to flow till the vessel is nearly empty, without any assistance, so that the attendant has no occasion to expose himself to the injuries and offensive fumes which almost immediately begin to escape. He may, however, approach the windward side of the tub, and give the mixture a little stirring, which should be continued for some little time afterward, so that the mixture may be complete. A convenient utensil for this purpose is a fork with two grains, long in the grain, bent at some distance from the grains nearly at right angles, and fixed in a wooden handle. On the same day a fresh lot of bones may be added, and the process repeated until the hogshead is nearly full. In two days afterward the mixture may be shoveled into a heap, and either remain till wanted or mixed at once with a certain portion of ashes. It should be shoveled over several times and ashes added at each time of turning, which will thus render the mixture fine and dry enough to pass through an ordinary drill.

It must be evident that much of the value and economy of the manure depends on its being perfectly mixed, so that every particle of bone should be exposed to the action of the acid. In many cases I have no doubt this has not been sufficiently attended to, and the result has been either that more acid has been used than is really required, or that much of the advantageous effects has been lost.

By the method which I have here recommended, and which I have adopted after many trials, the mixture can be readily and accurately manufactured, and with perfect safety to the attendants.*

5. Effect of various quantities applied in combination or comparison with common bones and other known manures.

My own experience of the advantages of sulphated bones commenced in the very dry summer of 1844. Wishing to try their effects, and thinking that it was highly desirable to apply them as a compost by means of the drill (though I had not heard of any instances in which they had been so used), I resolved to make the attempt. I intended to apply the bones at the rate of 3½ bushels per acre, and half their weight of acid: but from not making sufficient allowance for the dampness of the manure, it extended over a large portion of land, so that little more than 2 bushels per acre were used with about 16 bushels of ashes. On the same day (in the early part of July) other portions of the field were drilled with bone-dust at the rate of 16 bushels per acre, and some parts with South American guano. The bones and acid Swedes were the first to appear, and their tops grew most luxuriantly. The turnips suffered from not being hoed till they were too forward, but the crop throughout the field (considering the late period of their being drilled, and other unfavorable circumstances) was a very fair one, about 14 tons to the acre. The bones and acid portion was fully equal to the rest, and indeed somewhat better than where 16 bushels of bones had been applied to the acre.

Every alternate ridge was carted off, and the remaining half fed off by old ewes with no other food, with the exception of a little inferior hay. The field was then sown with dredge (a mixture of beans, barley and peas), and the crop was a very excellent one; that where the vitriolized bones had been used was at the least fully equal to any portion of the field, and indeed somewhat superior to that dressed with bones alone. Thus it will be seen that the manure answers perfectly well so far as the second crop is concerned; and there is now the prospect of a good clover crop.

The result of the preceding year having fully satisfied me as to the value and economy of vitriolized bones, I did not think it necessary to test their merits against other manures during the last season, particularly as other equally successful experiments had been tried and published.

But, wishing to ascertain the most economical proportion of acid to be employed, I prepared two lots for a field of 6 acres. In one the bone-dust was at the rate of 4 bushels to the acre, and the acid one-third: and in the other the acid was half the weight of the bones, but the latter was diminished so as to reduce the cost of both lots to the same sum. The mixture in each instance extended over half an acre more than was intended, and was mixed with equal portions of ashes, viz. about 20 bushels to the acre.

The Swedes came up well, and, though attacked by the fly, soon got out of its way, and proved a very good crop. The average of the field, however, was very much reduced by the great quantity of hedge-row timber by which it was surrounded, and which spread its blighting influence a considerable distance. However much these trees might add to the beauty of the landscape, they certainly destroyed most effectually the beauty and uniformity of the turnip crop, and reduced the average of the field several tons per acre. A good portion of the field appeared to average

* In manufacturing a considerable quantity of the mixture to meet a large demand for the present season (1846), I have found much advantage from constructing various utensils of different shapes, so as to perfect the mixture without inconvenience to the attendants, as well as from other improvements in the manipulative process. [*Aut.*

about 22 tons per acre, and the half where the larger quantity of bone-dust with one-third its weight of acid was used, proved superior to the other, though whether to be attributed to the difference in the manure, or to the fact of that part of the field being somewhat drier, it is difficult to say.

The field was a clay loam on the London clay, and was partially drained.

I also supplied various agriculturists in my neighborhood with vitriolized bones, prepared in the proportion of 4 bushels (180 lbs.) of bone-dust, and 60 lbs. of concentrated sulphuric acid, which I recommended to be applied to an acre when no other manure was employed. The result in nearly every instance has been decidedly favorable.

Mr. W. Gater, of Westend, employed it at the rate of 2 bushels of bones to the acre, in addition to a fair dressing of farm-yard dung. On a portion of the field the dung was used alone. The former was fit for the hoe several days before the latter; and on weighing portions of each, in January last, there was a superiority of 5 tons to the acre in favor of that portion which had received the addition of sulphated bones.

Mr. J. W. Clark, of Timsbury, used the manure which I supplied him with in the same proportions also, in addition to farm-yard dung, and the Swedes proved the best on his farm. The amount of vitriolized bones used per acre varied in different parts of the field, and the goodness of the crop precisely corresponded to the quantity applied.

Mr. J. Blundell, of Bursledon also used it at the rate of 4 bushels of bones to the acre, with 6 bushels of ashes in competition with night-soil and ashes. On visiting his farm a few weeks afterward, I noticed, at several fields' distance, the superiority of one portion of the field, which I found was that on which the vitriolized bones had been used. The dampness of the season, however, proved so favorable to the development of the other manure that, on weighing them in December, the latter was found about half a ton per acre heavier; the expense, however, was nearly double. The weight of the crop was between 17 and 18 tons per acre. I have no doubt that if Mr. B. had applied 20 bushels of ashes to the acre, instead of 6, with the sulphated bones, the result would have been much more favorable. When we bear in mind the large amount of potash contained in the crop, it must be very evident that it is of importance to supply a good quantity of ashes which contain a fair proportion of potash; I would therefore recommend that 20 bushels of ashes per acre, at least, should always be employed.

Mr. Pocock, of Hickley, used the manure at the rate of 4 bushels per acre, and one-third acid, and was well pleased with the result, though he did not ascertain its amount.

Mr. Withers, of Luzborough, was another farmer to whom I furnished a quantity, prepared as before mentioned, and he reports very favorably of the results.

Mr. Fielder, of Sparsholt, was induced by my representation of its favorable effects to try the manure, and he found that on his light land on the chalk it answered admirably.—Two bushels of vitriolized bones with ashes successfully rivaled a small portion of ground drilled at the rate of 60 bushels of bones to the acre for the purpose of experiment.

Although the vitriolized bone has proved very successful with white turnips, I believe that its peculiar excellences are most fully proved by Swedes. I wished to ascertain this by experiment, and accordingly on the same day and on similar land, a clay loam, 3 acres were drilled with Laing Swedes, and 3 acres with Matson's white globes after tares. The Swedes proved decidedly superior both in the early and later stages; and though the roots, as might have been anticipated, were but of moderate size, in consequence of the very late time of drilling (early in August), yet on comparing a few rods without manure the difference was very striking. A small portion of the globes, drilled with ashes alone, also exhibited a similar inferiority.

It should be observed, however, that in this experiment the land was probably more suited for Swedes than white turnips; but, on the other hand, the lateness of the season was more unfavorable to the Swedes, besides which the crop previous to the globes had been manured with stable-dung, while the other field had received no dressing since 1843.

Supposing that these results are to be attributed to the greater suitability of the manure for Swede, and not owing to other causes, the result is certainly in keeping with the comparative analysis of the ashes of Swedes and white turnips, which tells us that the former contains 403 lbs. of phosphoric acid, and the latter only 73 lbs. in 100,000 lbs. each.

It must be evident from this circumstance that white turnips do not require so large a quantity of bones, whether vitriolized or not; and it also corresponds with the well-known facts that Swedes require a larger quantity of dung to supply the necessary phosphoric acid, and also that white turnips on favorable land can be raised with ashes alone far more easily than Swedes.

I would therefore recommend in all cases, with white turnips, that a less quantity of vitriolized bone be employed, and that guano, or some other manure possessing its properties, should be used in combination with it.

In May last, a portion of land, consisting of 1½ acres, was drilled with Matson's green top globes, and manured with 1 bushel of sulphated bones, 1 cwt. of African guano, and about 25 bushels of turf-ashes, per acre. The crop was a very good one, exceeding 20 tons to the acre.

In several instances within my own knowledge, where guano has been used with ashes, the crop has been destroyed by the pungency of the manure, probably owing to the ammonia which it contains. There is no danger of

this taking place with vitriolized bones; and I have found, though seeds will not vegetate if entirely surrounded with them, they readily will if the manure is mixed with twice its weight of mould.

The last season has not been a favorable one for displaying the peculiar advantages of vitriolized bones; or, rather, it has been from its wetness so favorable for common bones, and every other description of manure, that an indifferent field of turnips has been the exception and not the rule. It is in a dry season, when the fly is particularly rife and active, when crop after crop is destroyed by this entomological pest, that the advantage of insuring a vigorous growth to young plants is properly appreciated. Among all the specifics or antidotes for the fly, there is none, I believe, equal to the employment of vitriolized bones. Hitherto I have not met with or heard of a single instance in which it has failed to force the plants out of the way of the fly. It is in a dry season, too, that the advantages of early and vigorous growth are shown, when the plant may languish for weeks for want of rain with ordinary manures, and thus lose time that never afterward can be compensated for.

In a garden experiment tried on a small scale, to show the effect of different preparations in forcing the young plant out of ground, I found the following results:

1. Vitriolized bone applied in solution above the seed caused the plant to appear on the fourth day.

2. The same applied below the seed brought up the plant on the fifth day.

3. Vitriolized bones as compost brought up the plant on the sixth day, both when applied above and below the seed.

4. Sulphuric acid and water below the seed caused the turnip to make its appearance on the sixth day.

5. Bone-dust below the seed brought up the plant on the seventh day, the same time as it appeared where no manure was employed.

In the above instances, with the exception of the fourth, the expense of the manure was the same in each case.

General Conclusions.

From the facts and reasons which we have detailed and urged in our preceding Essay, as well as from information supplied by previous experimenters, we may deduce the following conclusions:

1. That superphosphate of lime is the essential manure for turnips, and particularly for Swedes. That with it alone a good crop can be raised; but without it the turnip will not thrive, however rich the manure may otherwise be.

2. In preparing the mixture, the bones should be in as fine a state as possible.

3. That sulphuric acid, from its greater strength and cheapness, is preferable to muriatic acid.

4. That water, in the proportion of one-half the weight of the acid, should be first sprinkled over the bones.

5. The proportion of sulphuric most economical to employ should not be less than one-third, nor more than one-half the weight of the bones, and that probably the medium between these two quantities is most advantageous.

6. That the mixture can be applied either diluted with a considerable quantity of water by the aid of a water-cart, or with ashes by means of an ordinary drill. That though the former may be more speedy in its effects, the latter can be more conveniently applied, and has the advantage of admitting the addition of a large quantity of ashes.

7. That vitriolized bones may be used either alone or with other manures, and that when the latter are at hand, it is more advantageous to use the former in combination with them. For instance, if there are 30 acres to be prepared, and only sufficient dung to dress 15 acres, it is better to give a half-dressing of dung over the whole of the turnip break, and make up the deficiency by means of sulphated bones. Thus the plant will be forced in its early, and supported in its later growth. For the same reason, vitriolized bones may be advantageously combined with guano.

8. That vitriolized bones are equally advantageous to the second year's crop, when the turnips are either wholly or partially fed off with sheep.

9. That, while the economy of this manure is thus proved by practice, it can be as readily explained by theory, *e. g.*: The tops of Swedes are known to possess double the phosphoric acid contained in the bulbs. Thus the superphosphate of lime in the manure causes the rapid development of the leaves—one of its peculiar properties. The leaves being thus early and largely developed, are enabled to extract a considerable portion of nourishment from the atmosphere—much more, indeed, than where the leaves are small and backward. The difference between the amount of food derived from the atmosphere by a forward and flourishing crop, and that obtained by a backward and dwarfish crop, is so much absolute gain to the farmer, or rather to the land. It costs nothing on the one hand, but yields considerably to the land if the crop is fed off on the other. A manure that would thus force on the turnip in the early stages of its growth, was long felt to be a desideratum by agriculturists. This want has now been supplied; and even if this were the only recommendation sulphated bones possessed, its discovery and introduction would still be a boon.

Lastly. The value of vitriolized bone may now be considered to be fully and fairly established. Its claims rest not on the assertions of a few experimenters. It has been tried during the last season by hundreds with success, and in the next it will be tried by thousands. It affords, in fact, a triumphant

THE SCREW.

From Dr. Dion. Lardner's Lectures.

In the application of the screw, the weight or resistance is not, as in the inclined plane and wedge, placed upon the surface of the plane or thread. The power is usually transmitted by causing the screw to move in a concave cylinder, on the interior surface of which a spiral cavity is cut, corresponding exactly to the thread of the screw, and in which the thread will move by turning round the screw continually in the same direction. This hollow cylinder is usually called the *nut* or *concave screw*. The screw surrounded by its spiral thread is represented in fig. 8; and a section of the same playing in the nut is represented in fig. 9.

Fig. 8.

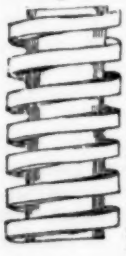
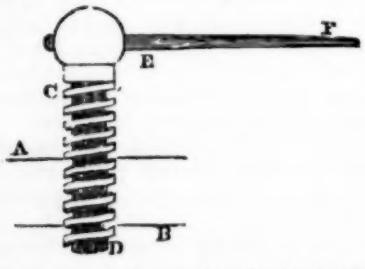


Fig. 9.



There are several ways in which the effect of the power may be conveyed to the resistance by this apparatus.

First, let us suppose that the nut A B is fixed. If the screw be continually turned on its axis, by a lever E F inserted in one end of it, it will be moved in the direction C D, advancing every revolution through a space equal to the distance between two contiguous threads. By turning the lever in an opposite direction, the screw will be moved in the direction D C.

If the screw be fixed, so as to be incapable either of moving longitudinally or revolving on its axis, the nut A B may be turned upon the screw by a lever, and will move on the screw toward C or toward D, according to the direction in which the lever is turned.

In the former case, we have supposed the nut to be absolutely immovable; and, in the latter case, the screw to be absolutely immovable. It may happen, however, that the nut, though capable of revolving, is incapable of moving longitudinally; and that the screw, though incapable of revolving, is capable of moving longitudinally. In that case, by turning the nut A B upon the screw by the lever, the screw will be urged in the direction C D or D C, according to the way in which the nut is turned.

The apparatus may, on the contrary, be so arranged that the nut, though incapable of revolving, is capable of moving longitudinally; and the screw, though capable of revolving, is incapable of moving longitudinally. In this case, by turning the screw in the one direction, or in the other, the nut A B will be urged in the direction C D or D C.

All these various arrangements may be observed in different applications to the machine.

A screw may be cut upon a cylinder by placing the cylinder in a turning-lathe, and giving it a rotatory motion upon its axis. The cutting point is then presented to the cylinder, and moved in the direction of its length, at such a rate as to be carried through the distance between the intended thread, while the cylinder revolves once. The relative motions of the cutting point and the cylinder being preserved, with perfect uniformity, the thread will be cut from one end to the other. The shape of the threads may be either square, as in fig. 8, or triangular, as in fig. 10.

The screw is generally used in cases where severe pressure is to be excited through small spaces; it is, therefore, the agent in most presses. In fig. 11, the nut is fixed, and by turning the lever, which passes through the head of the screw, a pressure is excited upon any substance placed upon the plate immediately under the end of the screw.—In fig. 12, the screw is incapable of revolving, but is capable of advancing in the direction of its length. On the other hand, the nut is capable of revolving, but does not advance in the direction of the screw.—When the nut is turned by means of the screw inserted in it, the screw advances in the direction of its length, and urges the board which is attached to it upward, so as to press any substance placed between it and the fixed board above.

Fig. 10.

Fig. 11.

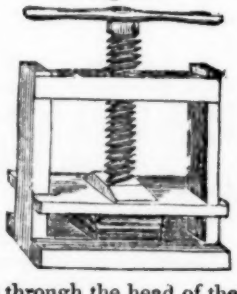
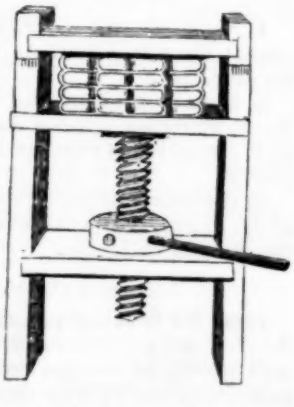


Fig. 12.



In cases where liquids or juices are to be expressed from solid bodies, the screw is the agent generally employed. It is also used in coining, where the impression of a die is to be made upon a piece of metal, and in the same way in producing the impression of a seal upon wax or other substance adapted to receive it. When soft and light materials, such as cotton, are to

be reduced to a convenient bulk for transportation, the screw is used to compress them, and they are thus reduced into hard, dense masses. In printing, formerly, the paper was urged by a severe and sudden pressure upon the types by means of a screw.

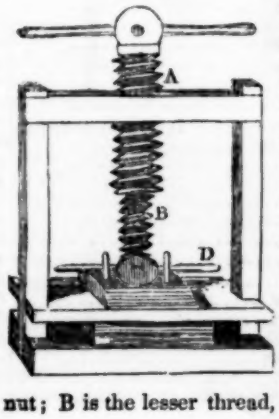
As the mechanical power of the screw depends upon the relative magnitude of the circumference through which the power revolves, and the distance between the threads, it is evident, that to increase the efficacy of the machine, we must either increase the length of the lever by which the power acts, or diminish the magnitude of the thread. Although there is no limit in theory to the increase of the mechanical efficacy by these means, yet practical inconvenience arises which effectually prevents that increase being carried beyond a certain extent. If the lever by which the power acts be increased, the same difficulty arises as was already explained in the wheel and axle: the space through which the power should act would be so unwieldy, that its application would become impracticable. If, on the other hand, the power of the machine be increased by diminishing the size of the thread, the strength of the thread will be so diminished, that a slight resistance will tear it from the cylinder. The cases in which it is necessary to increase the power of the machine being those in which the greatest resistances are to be overcome, the object will evidently be defeated if the means chosen to increase that power deprive the machine of the strength which is necessary to sustain the force to which it is to be submitted.

These inconveniences are removed by a contrivance of Mr. Hunter, which, while it gives to the machine all the requisite strength and compactness, allows it to have an almost unlimited degree of mechanical efficacy.

This contrivance consists in the use of two screws, the threads of which may have any strength and magnitude, but which have a very small difference of breadth. While the working point is urged forward by that which has the greater thread, it is drawn back by that which has the less; so that, during each revolution of the screw, instead of being advanced through a space equal to the magnitude of either of the threads, it moves through a space equal to their difference. The mechanical power of such a machine will be the same as that of a single screw, having a thread whose magnitude is equal to the difference of the magnitudes of the two threads just mentioned.

Thus, without inconveniently increasing the sweep of the power, on the one hand, or on the other, diminishing the thread until the necessary strength is lost, the machine will acquire an efficacy limited by nothing but the smallness of the difference between the two threads.

Fig. 13.



This principle was first applied in the manner represented in fig. 13. A is the greater thread, playing in the fixed nut; B is the lesser thread, cut upon a smaller cylinder, and playing in a concave screw, cut within the greater cylinder. During every revolution of the screw, the cylinder A descends through a space equal to the distance between its threads. At the same time, the smaller cylinder B ascends through a space equal to the distance between the threads cut upon it: the effect is, that the board D descends through a space equal to the difference between the threads upon A and the threads upon B, and the machine has a power proportionate to the smallness of this difference.

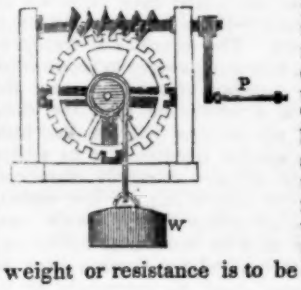
Thus, suppose the screw A has twenty threads in an inch, while the screw B has twenty-one: during one revolution, the screw A will descend through a space equal to the twentieth part of an inch. If, during this motion, the screw B did not turn within A, the board D would be advanced through the twentieth of an inch; but because the hollow screw within A turns upon B, the screw B will, relatively to A, be raised in one revolution through a space equal to the twenty-first part of an inch. Thus, while the board D is depressed through the twentieth of an inch by the screw A, it is raised through the twenty-first of an inch by the screw B. It is, therefore, on the whole, depressed through a space equal to the excess of the twentieth of an inch above the twenty-first of an inch—that is, through the four hundred and twentieth of an inch.

The power of this machine will, therefore, be expressed by the number of times the four hundred and twentieth of an inch is contained in the circumference through which the power moves.

In the practical application of this principle at present, the arrangement is somewhat different, The two threads are usually cut on different parts of the same cylinder. If nuts be supposed to be placed upon these, which are capable of moving in the direction of the length, but not of revolving, it is evident that by turning the screw once round, each nut will be advanced through a space equal to the breadth of the respective threads. By this means the two nuts will either approach each other, or mutually recede, according to the direction in which the screw is turned, through a space equal to the difference of the breadth of the threads, and they will exert a force either in compressing or extending any substance placed between them, proportionate to the smallness of that difference.

A toothed wheel is sometimes used instead of a nut, so that the same quality by which the revolution of the screw urges the nut forward is applied to make the wheel revolve. The screw is in this case called an endless screw, because its action upon the wheel may be continued without limit. This application of the screw is represented in fig. 14. P is the winch to which the power is applied; and its effect at the circumference of the wheel is estimated in the same manner as the effect of the screw upon the nut.—This effect is to be considered as a power acting upon the circumference of the wheel; and its proportion to the weight or resistance is to be calculated in the

Fig. 14.



same manner as the proportion of the power to the weight in the wheel and axle.

We have hitherto considered the screw as an engine used to overcome great resistances. It is also eminently useful in several departments of experimental science, for the measurement of very minute motions and spaces, the magnitude of which could scarcely be ascertained by any other means. The very slow motion which may be imparted to the end of a screw, by a very considerable motion in the power, renders it peculiarly well adapted for this purpose. To explain the manner in which it is applied—suppose a screw to be so cut as to have fifty threads in an inch. each revolution of the screw will advance its point through the fiftieth part of an inch. Now, suppose the head of the screw to be a circle, whose diameter is an inch, the circumference of the head will be something more than three inches; this may be easily divided into a hundred equal parts distinctly visible. If a fixed index be presented to this graduated circumference, the hundredth part of a revolution of the screw may be observed, by noting the passage of one division of the head under the index. Since one entire revolution of the head moves the point through the fiftieth of an inch, one division will correspond to the five thousandth of an inch. In order to observe the motion of the point of the screw in this case, a fine wire is attached to it, which is carried across the field of view of a powerful microscope, by which the motion is so magnified as to be distinctly perceptible.

A screw used for such purposes is called a *micrometer screw*. Such an apparatus is usually attached to the limbs of graduated instruments, for the purpose of astronomical and other observation. Without the aid of this apparatus, no observation could be taken with greater accuracy than the amount of the smallest division upon the limb. Thus, if an instrument for measuring angles were divided into small arches of one minute, and an angle were observed which brought the index of the instrument to some point between two divisions, we could only conclude that the observed angle must consist of a certain number of degrees and minutes, together with an additional number of seconds, which would be unknown. inasmuch as there would be no means of ascertaining the fraction of a minute between the index and the adjacent division of the instrument. But if a screw be provided, the point of which moves through a space equal to one division of the instrument, with sixty revolutions of the head, and the head itself be divided into one hundred equal parts, each complete revolution of the screw will correspond to the sixtieth part of a minute, or to one second, and each division on the head of the screw will correspond to the hundredth part of a second. The index being attached to this screw, let the head be turned until the index be moved from its observed position to the adjacent division of the limb. The number of complete revolutions of the screw necessary to accomplish this will be the number of seconds; and the number of parts of a revolution over the complete number of revolutions will be the hundredth parts of a second necessary to be added to the degrees and minutes primarily observed.

It is not, however, only to angular instruments that the micrometer screw is applicable; any spaces whatever may be measured by it. An instance of its mechanical application may be mentioned in a steel-yard, an instrument for ascertaining the amount of weights by a given weight, sliding on a long graduated arm of a lever. The distance from the fulcrum, at which this weight counterpoises the weight to be ascertained, serves as a measure to the amount of that weight. When the sliding weight happens to be placed between two divisions of the arm, a micrometer screw is used to ascertain the fraction of the division.

Hunter's screw, already described, seems to be well adapted to micrometical purposes; since the motion of the point may be rendered indefinitely slow, without requiring an exquisitely fine thread, such as, in the single screw, would in this case be necessary.

COMPARATIVE VALUE OF DIFFERENT KINDS OF FODDER.—The following table is the result of experiments made by the principal agriculturists of the continent, and published by M. Antoine at Nancy. The best upland meadow hay is taken as the standard, at 100 lbs.; and the specified weight of the other kinds of fodder enumerated are required to produce the same results:

	lbs.
Good hay	100
Aftermath hay	102
Clover hay, made when the blossom is completely developed	90
Ditto, before the blossom expands	88
Clover, second crop	98
Lucerne hay	98
Sainfoin hay	89
Tare hay	91
Spergula arvensis, dried	90
Clover hay, after the seed	146
Green Indian corn	275
Vetches or tares, green	410
Green clover	457
Green spergula	425
Stems and leaves of Jerusalem artichokes	325
Cow-cabbage leaves	541
Beet-root leaves	600
Potato haulm	300
Rye straw	442
Oat straw	196
Peas haulm	153
Vetch haulm	159
Bean haulm	140
Buckwheat straw	195
Dried stalks of Jerusalem artichokes	170
Dried stalks of Indian corn	400
Millet straw	250
Raw potatoes	201
Boiled ditto	175
White Silesian beet	220
Mangel-wurzel	839
Turnips	504
Carrots	276
Swedish Turnips	308
Ditto, with leaves on	350
Grain—Rye	54
Wheat	42
Barley	54
Oats	59
Vetches	50
Peas	45
Beans	45
Buckwheat	64
Indian corn	57
Linseed cake	69
Wheat bran	105
Rye bran	109
Wheat, peas and oat chaff	167
Rye and barley chaff	179